Accounting and estate management in North-East England c.1700-1770 with particular reference to the Bowes estates

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ACCOUNTING AND ESTATE MANAGEMENT IN NORTH-EAST ENGLAND c.1700-1770 WITH PARTICULAR REFERENCE TO THE BOWES ESTATES

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Submitted for the degree of M.Phil.

University of Durham

1998

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ABSTRACT

Through the accounts, the thesis examines estate accounting and management practice in the north-east of England, with special reference to the Bowes, in order to ascertain whether estates were managed efficiently as productive investments, and whether accounting aided managerial activity at this early stage of industrial development. George Bowes was the estate proprietor for most of the period in question. His active involvement in the day-to day operations of his estates, coupled with the geographical spread of his activities and his distance from events, necessitated a centralised organisational structure, that was capable of delegating responsibility to stewards in key areas, whilst, at the same time, retaining control at the centre. This was achieved through a unified reporting network, which ensured that management and accounting practices were highly integrated over different activities. Generally, the accounts were based on the bilateral recording of cash receipts and payments, with adjustments for opening and closing debtors, creditors and stocks as appropriate. Charge and discharge accounts did not predominate. Most of the accounts were prepared by the stewards. The majority of the estate accounts were designed to keep track of rights and obligations. There was a close linkage between the form of the accounts and the mode of organisational control, and the accounting procedures were flexible enough to respond to organisational changes. Written agreements underpinned the contractual obligations of third parties, and accounts were used to monitor compliance. Internal audit checks increased their effectiveness as a control mechanism. The survival of cost analysis, profit statements and planning data indicates that profit maximisation was also an important issue - the estates were not treated simply as units of consumption - and that the accounts played an important facilitating role. Colliery viewers were instrumental here. There are indications that a knowledge-power mechanism also existed within the estates, casting doubt on both the mutual-exclusivity of particular explanations of accounting activities, and on the notion that a relevant distinction exists between 'modern' and 'pre-modern' business organisation.

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ACKNOWLEDGEMENTS

I wish to acknowledge the help of Prof. A.R. Appleyard, Dr. T. Boyns, Prof. J. R. Edwards, Prof. M. Jones, Prof. N. McCord, Mr. T. McLean and my wife, and to thank Lt.-Col. P.J. Cardwell Moore for supplying a photograph of George Bowes' portrait in Glamis Castle. Special thanks also to Miss J. Gill and the staff of the Durham and Northumberland County Record Offices, and to my supervisor, Dr. R.A. Lomas.

STATEMENT OF COPYRIGHT

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INTRODUCTION

Through the accounts, the thesis examines estate accounting and management practice in the north-east of England c.1700 to 1770, with special reference to the Bowes estates. The Bowes estates are unusual in the continuity of the business records over such an extended timescale - c.1700 to 1940 - and in the large quantity of data surviving from the early part of the period. Accounts pervaded every aspect of the Bowes estates' operations from the housekeeper's groceries to the lead and coal mines, and thus provide direct evidence of the underlying management systems, and degree of integration over a diverse range of activities. The accounting records are also significant in what they reveal about the technical state of accounting knowledge, and the role and status of accounting within the organisation. Throughout, the thesis refers to various technical accounting and industrial terms, which are explained in the glossary in Appendix 1.

Although there are many questions relating to estates, two have tended to dominate the economic and accounting history literature. The first concerns the productivity of estates. Were estates managed efficiently as productive investments? The second question is connected with the first. Did accounting aid managerial activity at this early stage of industrial development? These are the central questions the thesis attempts to answer by examining the nature and function of accounts within the organisation.

Estates as productive/non-productive investments

Pollard [1] stated two principal reasons why the English landed estate influenced the development of management during the Industrial Revolution; and the same could be

said about why estate accounting is regarded as important to the development of modern accounting practice: (1) The estate represented the largest and most clearly defined type of business organisation in existence at the dawn of industrialisation. Estate management had a long history. Oschinsky, for example, noted the existence of four medieval treatises on estate management and about twenty on estate accounting.[2] (2) The growth of industries on estates resulted in the transference of estate management practices into industry. Estate industry was encouraged by English law, which gave landowners ownership of the minerals under their land.[3] The combination of these two factors encouraged the dissemination of estate practice to other sectors during the Industrial Revolution. Napier argued this was the case for nineteenth century canal and railway companies,[4] and the same was true of coal, where formative management and accounting practice was developed on estates.

Although estates are deemed to have played a key role in the development of management practice, it is uncertain whether they were managed efficiently as productive investments. For example, English estate owners have tended to be portrayed as a 'class of consumers',[5] who did not adopt a 'business-like approach' in the management of their properties.[6] According to Habakkuk,

> there is some incongruity in investigating the entrepreneurial activities of landowners, since the main point about landowners - in England at least - is that they did not acquire their land in order to develop it, but in order to enjoy it.[7]

Nunn concurred. He concluded that, on the whole, the rational maximisation of income did not feature on the great estates in south Yorkshire (1700-1850), and that the behaviour of the landowners was not entrepreneurial:

> The conclusions which emerge from this study amount to a denial that landowners were likely to 'rationally maximize their incomes' and a specific demonstration that upon these large estates economicism did not reign. Paradoxically this does not deny their importance as leading organizers of

> improved agriculture, providers of social overhead and industrial capital, and exponents of urban development. On the contrary it is demonstrated that they made a large contribution without which industrialisation would have been obstructed, but that their perspective was long term and permissive rather than entrepreneurial in general.[8]

As the largest providers of industrial capital in the region, the south Yorkshire magnates played a vital role in promoting industry, but their contribution was indirect. Nunn found that with the exception of mining, they preferred not to invest in industry; and in mining, they avoided risk by leasing their collieries to local businessmen.[9] Aley said this was also true in Nottinghamshire (1660-1840):

> Landed estates have not usually been regarded as units of economic utility, which is the line of argument adopted in this study ... Although partly reflecting the generally small scale of industry before the nineteenth century, landowners were not usually inclined to entrepreneurial functions unless this was promoted by strong self-interest, and an inclination for risk-taking, backed by substantial capital.[10]

However, not all authors agree. Beckett argued instead that the aristocracy played 'a crucial entrepreneurial role' in certain parts of the economy:

> After all, since an estate was held in trust to be passed on improved and developed, the minimum obligation of a life tenant was to develop his family's resources. Landed estates represented an important cog in the machinery of manufacturing and commerce ... In essence, the aristocratic entrepreneurial role involved working with the materials available on a landed estate, and promoting schemes in which landowners believed themselves to have a peculiar interest. They were to be found mining coal and ironstone, improving the road network, and laying down plans for urban development of their land.[11]

According to Beckett, landowners were particularly active in mining and heavy industry, and did not confine themselves to leasing their resources.[12] Raybould found evidence of entrepreneurship in mining on the Dudley estate in the Black Country.[13] There the mines continued to be worked directly under estate management rather than leased to coal-masters through till the early 1900s. Mingay concluded that even

though the main role of landowners in industrial development was providing capital for new enterprise,

> some landlords were still among the leading entrepreneurs of the later eighteenth century, particularly in the newer industrial areas.[14]

The idea that landowners were essentially not business-like, does not sit easily with the view that estates were important management nurseries, unless either that management was inefficient, or the estate organisation was sufficiently advanced to enable it to operate effectively without the intervention of the owners. The latter was true of the Lowthers of Westmorland:

> Ostensibly the Lowthers were country gentlemen, absentee owners who left their large estate, mansion and home farm, in the care of a land steward for nine months of each year while they looked after the county's business in Parliament. In fact, this was a facade concealing a well-oiled business machine ...[15]

Accounting could play a key role here. This applied to the Glamorgan estate of the Marquesses of Bute. The Butes were seldom in residence, and delegated the management of the estate to paid officials, controlling the whole operation through periodic accounting returns.[16]

Previous authors have highlighted the scientific nature of estate management in the eighteenth century, and the defined role of the estate steward. According to Pollard, the longevity of estates encouraged the development of management procedures.[17] Mingay said that by the eighteenth century, estate management had become more 'thorough and scientific', so that greater care was taken to ensure that estates' resources were profitably exploited.[18] Martin observed that it became 'increasingly efficient' as the century progressed, and that 'an increasing amount of attention' was devoted by contemporaries to defining the role of steward:

> Manuals were written and a knowledge of accountancy and surveying became almost indispensable, in addition to experience in legal matters. The stewards were expected to help their masters to realize the agricultural and industrial potential of their estates, in addition to overseeing the day-to-day business and supplying the landowner with money and information when he was away.[19]

Pollard maintained that stewards in the north of England in particular developed considerable industrial, commercial and financial expertise.[20] This was true of John Hardy, a steward in the West Riding of Yorkshire between 1773 and 1803. Beckett gives a detailed description of his activities which included advising on investments, mineral exploitation, textile production, canal and iron companies.[21] Such officials were highly remunerated. Hardy received £80 a year in addition to a favourable lease of Barnby Hall with extensive farmlands. In Glamorgan, a head steward could attract a salary of £150, whereas the average for other full-time officials ranged from £40 to £80.[22] A good education together with some financial standing were essential qualifications for the job.[23] Personal money gave a steward the prestige and social position that were necessary to engender respect from the tenants, as well as providing the proprietor with some security for the moneys entrusted to him.[24] According to Spring, stewards tended to be the sons of tenant farmers, yeomen, land agents, builders, surveyors and mining engineers:

> In a word they were the sons of practical men, often familiar from youth with the varied business of land management.[25]

Traditionally, economic historians have regarded estates as non-productive investments. Flinn argued that 'reverse investment' of merchants buying into land had a negative influence on capital formation during the Industrial Revolution, because it sterilised savings that would otherwise have been used more productively elsewhere.[26] Crouzet spoke of a net outflow of capital from industry to land-owning.[27] Both these authors recognised coal-mining as an exception. However, the

productivity of estates could be influenced by the attitudes of the individual landowners. William Cotesworth, a north-eastern merchant and landowner, is a case in point. On the one hand, his appetite for increasing his land-holdings left him seriously short of cash. As a result he decided to cut his investment in salt.[28] On the other, he set about improving his new properties at Shipcote and Gateshead with vigour to increase the value of his rents.[29] Given his rapacity in business, one wonders at his ability to treat his estates in any other way. Wilson observed a similar attitude in the land purchases of William Denison, an eighteenth century woollen merchant in the West Riding of Yorkshire.[30] His estates were purchased for economic motives. They provided the best outlet for surplus cash in times of depression. His practice was to buy land cheaply and then rapidly increase its value by extensive improvement. The Lowthers of Westmorland bought and sold land to consolidate their colliery interests.[31] Again, the answer for particular estates might lie in their accounts, as one might expect concern for efficiency and productivity to be evidenced by some kind of planning and profitability analysis. Perhaps this is anachronistic; although it is the absence of such data in previous case studies, coupled to the predominance of charge and discharge accounting, that has led commentators to conclude that estates were not managed 'as profit centres to be exploited'.[32] The thesis will argue that the Bowes estates were managed efficiently as productive investments, as evidenced by the systematic nature of the accounting and management arrangements, and the focus in the accounts on making activities profitable.

Accounting as an effective aid to management

The question of whether accounting encouraged or assisted managers and entrepreneurs in exploiting the new opportunities arising through the technological, demographic and market changes of the British Industrial Revolution has generated much debate. Most authors take the view that accounting was an ineffective management aid. According to Pollard,

> the practice of using accounts as direct aids to management was not one of the achievements of the British industrial revolution; in a sense, it does not even belong to the later nineteenth century, but to the twentieth.[33]

Pollard's pioneering work, *The Genesis of Modern Management*, is still the only general study in the field written for economic historians,[34] which is perhaps a reflection of the difficulties non-specialists encounter in interpreting accounting data. However, his views are supported by the majority of specialist accounting historians, who remain unconvinced that the British Industrial Revolution was an important formative epoch in the development of modern accounting practice. Authors such as Solomons, Garner, Chatfield and Parker attributed the origins of meaningful managerial accounting to the 1870s and 1880s.[35] Solomons saw it as the outcome of falling profit margins due to increased competition in the late nineteenth century. Furthermore, he believed that the impetus for better costing systems came from the United States rather than Great Britain.

Pollard's assertion that effective managerial accounting is the product of the twentieth century is supported by the testimony of contemporary British accountants, who regarded the First World War as the catalyst for good practice. The leading article in the first issue of *The Cost Accountant* (1919) reported that

> the war has, of course brought good costing methods prominently under the public eye. Many manufacturers are to-day keeping Cost Accounts who hardly knew that there were such things five years ago.[36]

Fells (1919) spoke of the success of the Cost Accounting Committee at the War Office in 'standardising the accounts in the Army, and getting cost accounts'.[37] Jenkinson (1919) described the costing procedures adopted by the Ministry of Munitions in the National Factories.[38] According to Todman (1922), it was the war that had encouraged firms to impose performance standards on the work-force, in an

effort to improve efficiency.[39] Blyth and Stelling (1922) acknowledged the precedent set by America for these changes.[40]

This negative view of British Industrial Revolution accounting also applies to estates. Indeed, Napier argued that eighteenth and nineteenth century concepts of land ownership on estates held back the development of industrial accounting.[41] According to him,

> the basic form of estate accounts as late as the nineteenth century had changed little from that developed in the Middle Ages for controlling and reporting on the activities of manorial bailiffs and reeves.[42]

He maintained that estate accounts enabled landowners to control their agents, and provided them with the cash flow information they needed to facilitate the the day-to-day operations of the estate. Cash flow information was particularly useful in a situation where the landowner wished to develop his property, but borrowing was constrained. Notwithstanding these advantages, Napier argued that estate accounts were wholly inadequate for the 'more directly commercial activities', that required 'both careful planning and more accurate monitoring of performance'.[43]

However, the debate is not all one-sided. Over the last ten years, there has been an increasing tendency to question the perceived shortcomings of managerial accounting in the British Industrial Revolution. From his observation of Welsh Industry in the eighteenth century, Jones concluded 'that the recording of cost estimates was a natural pursuit of those leading industrial development before the industrial revolution'.[44] Edwards identified a range of business decisions which were the subject of financial analysis in the eighteenth century, including whether and how much to produce.[45] The Darby and Carron iron-works 'were clear leaders in generating cost analyses to aid decision making', such as whether to forgo unprofitable product lines.[46] Decisions by the Carron Company in the 1770s to abandon certain

iron-fields were based on monthly reports of the differential costs of extracting iron ore.[47] In the late sixteenth century Daniel Hechstetter the younger compiled costing reports for the Duke of Northumberland's copper mines.[48] Based on an examination of the records of some two hundred enterprises from different sectors - principally iron, textiles and coal - Fleischman and Parker concluded that 'the comprehensiveness and variety of cost management practices during the British Industrial Revolution attest to their high priority with industrial entrepreneurs'.[49] Key accounting activities included expense control, responsibility management, product costing, overhead allocation, cost comparisons, cost analyses for special decisions, standard costing and inventory control. Technological innovations were a matter of 'deep concern' to entrepreneurs, because of their effect on profitability, and they used cost accounting 'to aid them in decisions involving the procuring, tracking, and comparing of their technological investments'.[50] For Fleischman and Parker, the British Industrial Revolution was a 'pioneering epoch in the development of cost accounting'.[51] They maintain that previous authors have been misled by the absence of a contemporary cost accounting literature, which has encouraged them to prejudge the issue.[52]

The debate has been complicated by disagreements over terminology. For example, Miller and Napier argue that the concept of *decision-making* in business is a recent innovation, and criticise previous studies for reading too much of the present into their interpretation of accounting practice during the British Industrial Revolution.[53] Fleischman and Parker disagree, stating that qualitative judgements are necessary when one is seeking the foundations of 'purposeful' and 'sophisticated' managerial accounting, and that present methodology acts as a useful reference point for defining these adjectives.[54] Hoskin and Macve maintain that managerial accounting originated in the US industrial environment of the 1840s.[55] However, the term *managerialism* is used by these authors in quite a narrow sense to describe the exercise of disciplinary power over labour through accounting. Other authors, such as

Tyson define it in a wider sense to encompass all rational management activity in pursuit of profits.[56]

Accounting historiography has become more theoretical in recent years.[57] Partly this is due to the methodological debates over research aims and directions which have impinged on the study of history as a whole. Partly it is due to the fact that most specialist accounting historians are accounting researchers first and foremost, and historians second. Research directions in accounting history are not therefore divorced from trends in accounting theory. Traditionally, accounting theory is grounded in neo-classical economic theory, but since the 1970s the hitherto 'dominant rule of economics' has come under increasing challenge from researchers who see accounting primarily as a social construction rather than an economic one.[58] Accounting researchers are uncertain whether their discipline is located at the heart of economic or social and political theory, and so they are using accounting history to justify their own perceptions of where it belongs. As a result, the debate over the managerial utilty of Industrial Revolution accounting has now crystallised into two main theoretical paradigms. So-called *Economic-rationalists* seek to explain accounting behaviour and accounting change in terms of the pursuit of wealth through rational decision making. Those authors supporting the view that the British Industrial Revolution was an important formative epoch in the development of modern accounting practice have tended to come from this school. The *Economic-rationalist* perspective has been challenged by followers of the social theorist, Michel Foucault, who interpret accounting as a 'disciplinary technology' that controls the lives of people within organisations through detailed surveillance.[59] Accounting thus becomes a source of power, through its ability to 'articulate' their performance.[60]

The question of when modern practice began is pertinant to both schools. The *Economic-rationalists* stress the continuous nature of accounting development [61] - Scorgie found progenitors of modern management accounting concepts on English

medieval estates [62] - in contrast to the *Foucauldians*, who see it as more discontinuous.[63] For Hoskin and Macve, there is a clear dividing line between the modern and the pre-modern accounting worlds.[64] According to them, disciplinary power and accounting first came together at Springfield Armory in the USA in the 1840s, through the imposition of standards of performance against which 'each individual's commitment and omissions were constantly evaluated'. This change may not have occurred in Great Britain until the 1920s, when formalised standard costing systems were adopted there.[65]

These questions are relevant to the present study because of the industrial character of north-eastern estates in the eighteenth century, allied to the omnipresence of accounting information within the organisation. The thesis will demonstrate that both the obligations of stewards/third parties and the profitability of activities were evaluated in the Bowes estates. Cost analyses and planning schedules were prepared, and the emphasis on planning in particular supports the view that accounting did aid economic desision-making at this early stage of industrial development. Moreover, the fact that accounting permeated every aspect of the Bowes estates, suggests a high degree of 'grammatocentrism' (use of writing) and 'calculability' (examination and grading), which Hoskin and Macve identify as the main dynamics driving the *Foucauldian* 'power-knowledge interaction'.[66] Is there any evidence that accounting knowledge acted as a power mechanism within the estate organisation? In the absence of explicit performance standards against which the efficiency of individuals was monitored, it is difficult to be categorical about whether accounting constituted a disciplinary technology. However, the thesis does find some evidence of this type of knowledge-power relation in the correspondence, casting doubts on the mutual-exclusivity of *Economic-rationalist* and *Foucauldian* explanations of accounting behaviour, and raising a question mark over the *Foucauldian* notion that a relevant distinction exists between 'modern' and 'pre-modern' business organisation.

Methodology and development of the thesis

One of the implications of the trend towards more theoretical accounting history has been a tendency to question the primacy of archival research.[67] Primary sources lose their central importance in historical research which substitutes theory for data.[68] However, there is a danger in this approach. The efficacy of causal theories of historical development depends on their ability to predict the results of future observations. The theoretical historian, therefore, comes to a problem having already predicted what the outcome will be - in this respect history becomes intrinsically uncritical - and looks for supporting evidence. Bryer, a 'Marxist' accounting historian, unwittingly summed up this approach. Reviewing a paper on what he described as 'the final stages of the transition from feudalism to investor capital', he wrote:

> If we can agree this [that there is a fundamental difference between the feudal and capitalist modes of production], then we have a conceptual and an historical basis for understanding the lords' 'ways of thinking', their 'aristocratic attitudes' (and platitudes), the overlap and contradiction of these notions of surplus in the aristocratic mind.[69]

Marxist theory shows the historian how to interpret historical evidence before he/she has started to look. There is no suggestion of deliberate deception. But, given the incompleteness of the historical record, together with the difficulties in accurately interpreting historical data, it is often possible to find evidence to support whichever claim. Maximizing wealth *(Economic-rationalist)*, commodifying labour *(Marxist)* and regularising relationships within the organization *(Foucauldian)* are not, after all, incompatible. An alternative non-theoretical view of historical development is that it is composed of interlocking causal relationships, which cannot necessarily be subsumed within unifying theories. In reality, there may be several reasons for a particular action, or what applies in one situation may not be valid in another, or the weighting of factors may vary between situations. Therefore, the best that can be achieved in history are situation-specific hypotheses, and the task of the historian is to

select the hypothesis which best fits the available evidence, whilst recognising its intrinsic limitations. The present study, which is archive based, affirms the need for more primary research to get as close as possible to the individual circumstances in which estate accounts were produced, the uses to which they were put, and the full range of participants involved. It supports the work of those archival researchers attempting 'to stand apart from the paradigmatic debates', whom Fleischman and Tyson believe are in danger of extinction.[70]

The original aim of the study was to investige the relationship between accounting and investment by landowners in new enterprise on Tyneside during the early years of the Industrial Revolution. The extent to which accounting information was a factor in investment decisions, and how effective an aid was it, were the central unanswered questions the thesis aimed to address. Three families were selected for examination - Bowes, Ridley and Cotesworth - who, by virtue of their leading role in the industry of the region during the first half of the eighteenth century, might enable one to form region-wide conclusions. The plan was modified for two reasons. First, the number of surviving accounts and reports had been grossly underestimated, making it impracticable to consider all three families within the context of the thesis. Therefore, the decision was taken to omit the Cotesworths, on the grounds that, unlike the other two families, their business fortunes had already been the subject of a detailed study, albeit from a non-accounting perspective.[71] As the Bowes papers contain the highest concentration of accounting information, it was further decided to make them the central core of the thesis, and to use the Ridley papers as a yardstick for assessing whether they were typical of contemporary practice on Tyneside. The accounts that have survived in the Ridley collection are much more fragmentary than in the Bowes, making it more difficult to build up a complete picture, but still useful for a comparison. Second, it soon became clear that most of the information in the accounts related to the general administration of the estates. New investment was an

issue, but a minority one. Consequently, the aim of the thesis was widened to consider accounting and estate management as a whole, including new enterprise.

Specifically, the study draws on three main collections of primary documents: the Strathmore archive, the archive of the North of England Institute of Mining and Mechanical Engineers, and the Ridley (Blagdon) archive. The Strathmore papers, which comprises the business and estate records of the Bowes and Lyon families in County Durham and Yorkshire - the two families became united by marriage in 1767 - are unusually rich in the quantity of business data that has survived from the eighteenth century. The Grand Allies' partnership, which dominated the Tyneside coal trade from its formation in 1726 until about 1770, was George Bowes' (1701-1760) single most important business activity. Most of the Grand Allies' records are found in the Mining Institute collection. In particular, the thesis refers to the Grand Allies' minute book (1727-1740), in addition to the records of contemporary colliery viewers, such as Amos and John Barnes, Stephen Drydon, Edward Smith (jnr.), Nicholas Walton, Richard Peck and others, who did work for the partnership. The fact that the minute book contains certain accounting reports specific to Sir Henry Liddell, the Grand Allies' senior partner, and that his residence, Ravensworth Castle, was a common meeting place, suggests that the book was originally his property. The Ridley archive contains the business and estate papers of the Ridley and White families in Newcastle and Northumberland. Their association as business partners began in the late seventeenth century, and culminated in the marriage of Matthew Ridley to Elizabeth White in 1742, which united the two families. The White-Ridleys resisted the ambitions of the Grand Allies by opposing a regulated coal market. Coming principally from a mercantile backgound, they bought into land, in contrast to the Bowes, who had held it continuously since the fourteenth century. The points of difference enhance the value of the comparison. Finally, the thesis refers to two ancillary collections: Charles Montagu's letter-book and the records of the Blackett (Wylam) family. Montagu leased the Bowes' coal mines at Gibside until 1723, and

his letter-book provides evidence of the management arrangements from a lessee's point of view. The Blackett papers contain detailed information relating to labour control in the Tyneside coal industry.

The remainder of the study is divided into five main sections. Chapter 2 describes the context for estate accounting in the north-east of England in the period 1700 to 1770. It considers the regional development of industry and estates on Tyneside in addition to the history of estate accounting in England. Chapter 3 discusses the estates together with the underlying organisation of their activities, and hence the need for, and knowledge of, accounting by those involved. It examines the role of the proprietor, the extent to which management and accounting practices were integrated over the various activities, the technical characteristics of the estate accounts and the accounting knowledge base. Chapters 4 and 5 ascertain the extent to which the estates were managed efficiently as productive investments, and whether accounting aided managerial activity, through detailed examination of the function of accounting data within the organisation. Chapter 6 concludes by summarising the findings of the study, and by identifying future research avenues.

Notes

1 Pollard, 1965: 25, 29-30

2 Oschinsky, 1956

3 Habakkuk, 1953

4 Napier, 1997

5 Habakkuk, 1953: 100

6 Thompson, 1963: 153

7 Habakkuk, 1953: 100

8 Nunn, 1985: vii

9 ibid: 235-7

10 Aley, 1985: 20-21

11 Beckett, 1986: 207-8

12 ibid: 208

13 Raybould, 1973: 182

14 Mingay, 1963: 201

15 Beckett, 1981: 13

16 Napier, 1991

17 Pollard, 1965: 27

18 Mingay, 1967: 4

19 Martin, 1979: 12, 25

20 Pollard, 1965: 29

21 Beckett, 1986: 143

22 Martin, 1979: 13-14

23 Mingay, 1967: 7 - 12

24 Martin, 1979: 17

25 Spring, 1963: 100

26 Flinn, 1966: 45-6

27 Crouzet, 1972: 178

28 Ellis, 1981

29 Manders, 1973: 128-9

30 Wilson, 1971: 147-153

31 Beckett, 1981: 24-5

32 Napier, 1991: 165

33 Pollard, 1965: 248

34 Edwards & Newell, 1994: 408

35 Solomons, 1952; Garner, 1954; Chatfield, 1977; Parker,1980

36 Boyns et al, 1996: 203

37 ibid: 207

38 ibid: 226

39 ibid: 251

40 ibid: 285, 288

41 Napier, 1997

42 Napier, 1991:164

43 ibid: 174

44 Jones, 1985: 199-200

45 Edwards, 1989

46 Fleischman & Parker, 1991

47 Fleischman & Parker, 1992

48 Edwards et al, 1990

49 Fleischman & Parker, 1997: 47

50 ibid: 234-5

51 ibid: 23

52 ibid: 9-10

53 Miller & Napier, 1993

54 Fleischman & Parker, 1997: 22-3

55 Hoskin & Macve, 1988

56 Tyson, 1992 & 1993

57 Fleischman & Tyson, 1997

58 Funnell, 1996

59 Loft, 1986: 139

60 Hoskin & Macve, 1988: 68

61 e.g. Edwards et al, 1995

62 Scorgie, 1997

63 Miller & Napier, 1993

64 Hoskin & Macve, 1988: 41

65 Edwards et al, 1995

66 Hoskin & Macve, 1997:3

67 Miller & Napier, 1993

68 Merino & Mayper, 1993; Fleischman & Tyson, 1997

69 Bryer, 1987: 3

70 Fleischman & Tyson, 1997: 102

71 Ellis, 1976

2

CONTEXT

Industry and estates on Tyneside

McCord said that industrialisation in the north-east of England occurred relatively early, although the pace of development was outstripped by other regions as the eighteenth century progressed.[1] Coal was the most significant output, with shipments to London rising from around 250,000 tons per year in 1600 to 650,000 tons in 1700. The fleet of colliers undertaking the two week voyage down the east coast increased from around four hundred in 1615 to over six hundred in 1703.[2] Coal had been mined in the area since earliest times, but it was during the thirteenth century that the coastal trade with London became firmly established.[3] The huge increase in output occurring from the late sixteenth century was fuelled principally by increased domestic consumption. The population of London and the towns of south-east England was rising, which factor, allied to a shortage of timber for fuel, 'created the surging demand for Tyneside coal'.[4]

As far as other industries were concerned, the region was producing more than half the national output of steel in 1750. The Crowley iron works in County Durham were exceptional in the eighteenth century in terms of their size and organisation. Salt output had risen to 15,000 tons annually by 1720, and shipbuilding, glass making and lead mining were also expanding.[5] According to Wood, there were four factories operating in Newcastle in 1737 that manufactured glass bottles.[6] Chartres described how the butter, meat and fish trades were boosted by the increase in salt production, as was the demand for draught animals by the growth in coal.[7] Newcastle became a principal port for the trade in copper and lead.[8] Wood added rope making and tanning

to the list.[9] Rope was needed both for shipping and mining, and trade between Russia and Newcastle led to the establishment of tanneries on the Tyne.

Coal was the major catalyst of industrialisation in the north-east, and its fortunes were closely tied to those of other industries. Sometimes there was common ownership and organisation, such as the colliery and salt interests of William Cotesworth, where the small coals unsuitable for domestic consumption were used to extract salt from sea water.[10] The same was true of the Ridleys who supplied their salt pans and glassworks with coal.[11] The Bowes family too were involved in salt panning. Local collieries were leased by the Crowleys in 1702 to supply their iron factories in County Durham.[12] The Bowes estates were another supplier. In 1732 Henry Day wrote to Thomas Hall, an agent at Gibside, complaining about the non-delivery of coal to the Crowley factory. George Bowes had agreed to supply the company, and delivery had become imperative as the old stock was 'almost exhausted'.[13] In Britain as a whole, it was coal that enabled the large-scale production of iron during the second half of the eighteenth century; and the archive of the Carron Company, in Scotland, contains cost analyses relating to coal production in 1768 and 1770.[14] Even before 1750, when the smelting of iron depended more on the supply of charcoal than of coal, coal was needed in the secondary production processes.[15] For instance, the Crowley works in Durham did not generally smelt iron. Instead they relied on imports from Sweden, but nevertheless consumed large quantities of coal in the secondary processes such as smith-work. The firm was even involved in the sale of coal, by shipping surplus stocks to London.[16]

Regional variations make generalisations about estates difficult. The relatively early industrialisation of the north-east was matched by the recent origins of many of the local landowners, such as the Cotesworths, Liddells, Carrs, Ellisons, Ridleys and Blacketts, who had made their fortunes in trade. According to James, some dozen families from a coal-owning background had settled on estates in Durham by the

1630s.[17] Forty-one percent of the fathers of Merchant Adventurer apprentices in Newcastle could describe themselves as 'gentlemen', which was 'a far higher proportion than in any other corporate town'.[18] The progression from merchant to landowner was typical of many regions, but it seems to have been 'accelerated' in the north-east.[19] The traditional view is that the older Catholic families of Northumberland and Durham were supplanted by merchant land-holders as a result of debts or sequestrations following the Civil War and Jacobite Rebellions,[20] although Bennett, Clavering and Rounding regarded this as an oversimplification.[21] According to them, the troubles of the Selbys of Winlaton, Riddells of Gateshead, and Brandlings of Jesmond, amongst others of 'a close-knit group of largely Catholic families', can be traced back to the early 1600s, and emanated from 'the ambitions of Protestant Brandlings, and disasters in Winlaton colliery, whose owners were only in part Catholic'.

Established landed families, such as the Bowes, shared the commercial interest of coal with the newcomers. Authors are agreed that it was the access to London via the sea which made Northumberland and Durham the largest and best developed coal field in Britain at the start of the eighteenth century;[22] and at the forefront of this dominance were the landowners.

> The motor [driving industrial activity] was Newcastle trade, and industrialization was the outcome of using its profits to exploit the landed resources tradesmen acquired.[23]

According to calculations contained within the estate papers, George Bowes' total profits from coal amounted to £9,778 in 1735 and £10,588 in 1736,[24] indicating the scale of his interest. The Grand Allies' minute book variously placed his share of the coal trade on the River Tyne as being between thirteen and fifteen per cent for the years 1727, 1732 and 1733.[25] The corresponding figures for the Liddells and Wortleys ranged from eighteen to twenty-seven per cent, and sixteen to eighteen

percent respectively. These three families typified Ashton and Sykes' comment that in Northumberland, Durham and Cumberland at least 'coal-mining was the main business of the landed proprietor and not merely one of many preoccupations.' [26] Buying into land by hostmen families such as the Liddells strengthened their position in the coal trade, by giving them control of coal reserves and wayleaves. The business orientation of the landed community in Northumberland and Durham poses the question of whether there was more of a tendency here, than elsewhere, for estates to be managed as profit-making investments. Certainly as far as the north-east coal trade was concerned, it seems that accounting information was used extensively from an early date, both for controlling the operations of collieries and for decision making.[27]

George Bowes, the youngest son of Sir William Bowes, was the most important member of the family in the eighteenth century. Ward described him as the prototype of the 'swashbuckling tycoon'.[28] To his contemporaries he was known as the 'count' or 'csar'.[29] George Bowes inherited the estates in 1722 at the age of twenty-one, following the premature deaths of his two elder brothers. According to Wills, he 'had looks, personality, and a talent for business affairs', together with an overbearing and autocratic temperament plus all the 'rashness of youth'.[30]

> The picture is of an arrogant and strong willed man, all the more determined to get his own way because of his extreme youth, and who would stop at nothing to get what he desired - at least in business.[31]

During the next forty years until his death, George Bowes played a major part in the Newcastle coal trade on his own account, and as a founder member of the Grand Allies cartel, which tried to take control of the entire trade. In addition to coal, he was involved in a range of other business activities, such as lead mining and smelting, salt panning, forestry and farming. George Bowes left his only child, Mary Eleanor, property valued upwards of £600,000, which was adjudged by contemporaries as sufficient to make a prospective husband 'one of the great peers of the Realm'.[32]

The transition of the Bowes family to landed status had occurred in 1310 when Adam Bowes, a successful lawyer, married Alice, heiress of Sir John Trayne. By the eighteenth century they were a well established landed family, whose seat of influence was the estate and castle of Streatlam in the south of County Durham. The acquisition of the Gibside estate in 1713 through the marriage of the heiress Elizabeth Blakiston to Sir William Bowes of Streatlam gave them influence in the north of the county also, and a share of the sea-sale coal trade to London. It was in fact through the marriage in 1767 of Sir William Bowes' grandchild Mary Eleanor to John Lyon, the ninth Earl of Strathmore, that the Bowes' estates eventually passed to the Strathmores. The Strathmores' tenure was interrupted only between 1820 and 1885 when the estates were held by John Bowes, the eleventh earl's nephew .[33]

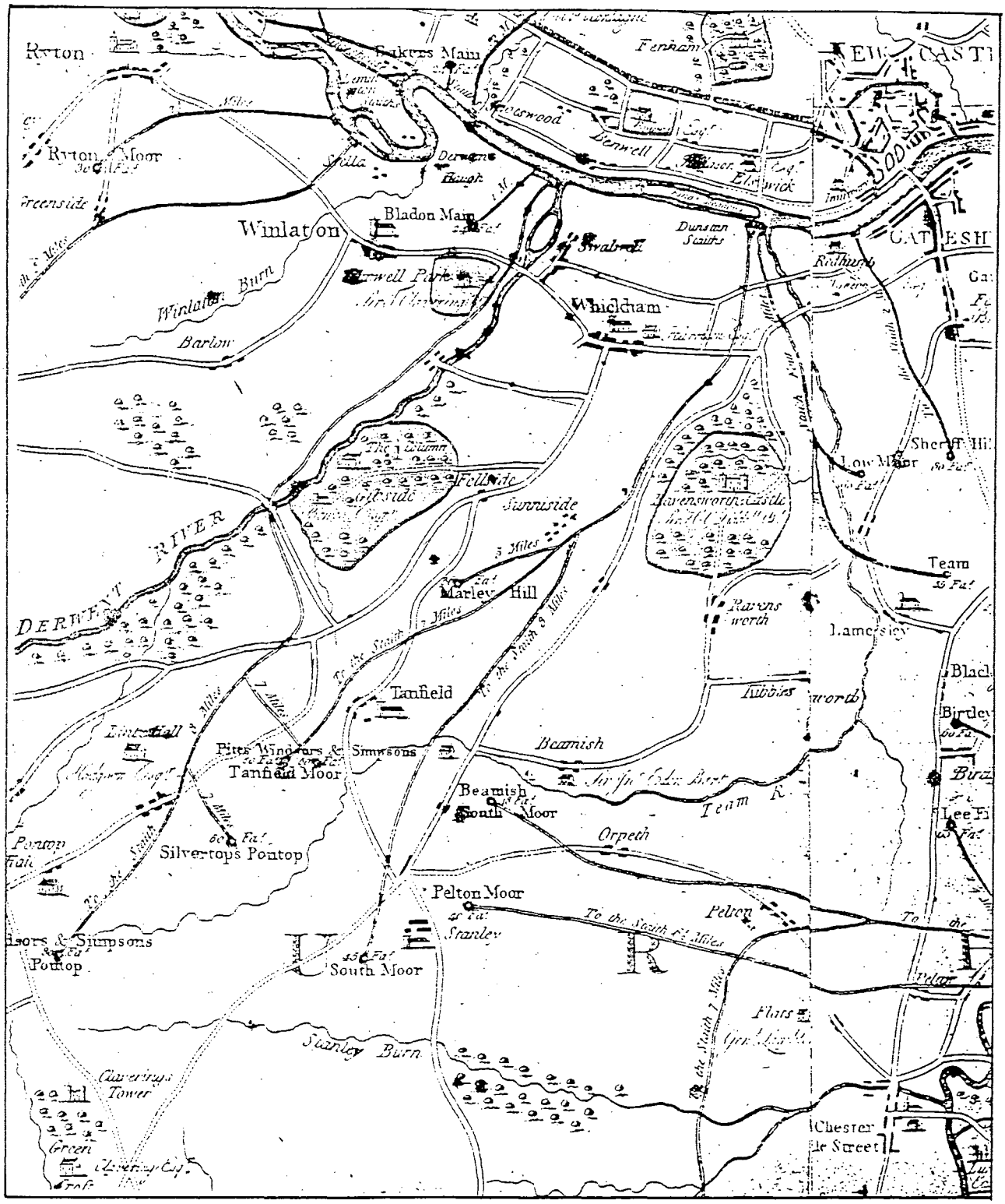
The Ridley family, for their part, had originally owned extensive lands in the west of Northumberland that were sequestrated by the Commonwealth for their loyalty to Charles I. Lady Ridley suggests that it was this loss which directed them into trade.[34] She describes how Nicholas Ridley and Matthew White became partners in the late seventeenth century, and together built up an extensive interest in the coal industry, acquiring mines in and around Newcastle. They were both part of the mercantile oligarchy which dominated the Newcastle Corporation. Matthew White was Mayor of Newcastle in 1691 and 1703, and Nicholas Ridley in 1688 and 1707. The tradition was maintained by their successors. Matthew White II, for example, served as governor of both the Newcastle Company of Merchant Venturers (1712-1739) and the Hostmen's Company (1713-1736). His nephew, Matthew Ridley, was Mayor of Newcastle in 1733, 1745 and 1751. The two families' business association was consolidated through marriage ties. Nicholas Ridley's son, Richard, married Matthew White's daughter, Margaret, and the two families finally became united in 1742 through the marriage of Matthew Ridley to Matthew White II's daughter, Elizabeth. The family's present estate at Blagdon in Northumberland was originally

purchased by Matthew White in 1700. The family also acquired lands in east Northumberland in the region between Plessey and Blyth, and built up an extensive range of business interests including quarrying, brick-works, salt pans, brewing, bottle-works, banking and developing the port of Blyth.[35]

The Bowes' mines at Gibside were variously referred to by contemporaries as 'Gibside', 'North Banks', 'Marley Hill' or 'Hutton' colliery. The first three place-names roughly describe different parts of the same colliery enterprise, although occasionally they were transposed. The name 'Hutton' was also used because of the thick Hutton coal-seam which lay above the Main Coal on the estate.[36] Gibside was rich in coal, which, by the time the Bowes family acquired it, had a successful history of extraction.[37] In 1778 William Brown, the colliery viewer, recorded that the Hutton seam at Gibside had 'been wrought for more than one hundred years past'. In 1980 the mine was still producing 1,000 tonnes per day and employing 860 men.[38]

Gibside was located in the north-west of County Durham on the River Derwent (Map 1). The estate's location was ideal, as it was strategically positioned in the main area of colliery and wagonway (horse-drawn railways for transporting coal to the Tyne) development in the first half of the eighteenth century. In 1700, mining in the region was concentrated on the Tyne itself to the west of Newcastle and Gateshead, and astride the Rivers Derwent and Team to the south. As the shallow and more easily worked seams near the Tyne became exhausted, the geological configuration of the region resulted in a south-westerly drift of mining towards Tanfield and Pontop. By 1750, most mining activity was still south of the Tyne, in the area between the Derwent and the Team, with only four of thirty-one working sea-sale collieries to the north.[39] The Ridleys were unusual in that their mining activities were concentrated north of the river to the east of Newcastle, and further north in east Northumberland. Bennett et al made a distinction between two classes of collieries

Map 1 Portion of a plan of the collieries on the Rivers Tyne and Wear, taken from surveys by John Gibson in 1788 [40]



at the time.[41] The first class they described as 'below bridge' because the coal was transported to staiths below Newcastle Bridge. These collieries 'for the most part' relied on 'long waggonways and free drainage', in contrast to the 'above bridge' mines that were nearer the river, 'and dependant on powerful engines to pump them'. The mining operations of the Bowes fell into the first class, and of the Ridleys into the second.

The expansion of coal mining south-westwards from Newcastle was facilitated by the building of wagonways, which were faster and more economical than the 'lumbering' coal wain, a type of cart.[42] Several wagonways either skirted or passed through the Gibside estate. The first, the Dunston Way, was completed in 1699 by Charles Montagu, who leased the estate mines at Gibside from 1692 to 1723. Montagu debarred his rivals Sir John Clavering, George Pitt and Thomas Brummell from using the Dunston Way, and the Bowes also refused them a wayleave over their property. A second wagonway (the Bucksnook Way) was therefore constructed along a route that avoided Gibside, and completed in 1712.[43] A third way was constructed (the Western Way) by William Blakiston Bowes (George's elder brother) in partnership with Lady Clavering and Richard Ridley. It ran parallel with the Bucksnook Way and took much of its traffic, and rendered the upper sections of the old Dunston Way redundant.[44] On its opening in 1721, William Blakiston Bowes, who had visited Italy in 1716, wrote:

> Last Munday we begun to lead down ye new Waggon Way, which is ye beginning of my profitt; it is a work of such great importance and crosses so many Mountains and Vales, which are all levelled, that I can compare it to nothing more properly than to ye Via Appia.[45]

The expansion of the system continued with the opening of the Tanfield Way in 1725 and the New Western Way in 1739.

Apart from the wagonways, the other major technical innovation of the period was the development of steam pumping machinery. Galloway enthused that

> The invention of the steam engine may safely be said to have been the most important event that has ever happened in the annals of mining ... Previous to its invention innumerable mines had already become drowned, and to all appearance hopelessly lost; the task of draining them being beyond the power of any machine in existence. [46]

The patent for the Newcomen engine rested with the 'Proprietors of the Invention for Raising Water by Fire' until 1733.[47] An agreement between the Proprietors and the Ridleys in 1718, allowing the latter to construct an engine at Byker, included patent royalties of £420 per annum.[48] By 1733 there were twenty-six such pumps in the region.[49] Thereafter the numbers accelerated with the freeing of the invention and the removal of royalties. Raistrick said that one hundred and thirty-seven engines were built on Tyneside between 1715 and 1778.[50] He observed that

> the first collieries to plan systematic exploitation dependent on steam pumping, were those of Heaton, Jesmond, and Byker, all situated north of the Tyne and east of Newcastle, grouped around the High Main coal outcrops that occur in the valley of the Ouseburn (now Jesmond Dene) tributary of the Tyne.[51]

The Ridleys had interests in all three of these mines, and it is not coincidental that they played a major part in the development of the steam engine on Tyneside. Their chief engineer from 1717 to 1725 was Martin Triewald from Sweden. He built four more Newcomen engines for the family, in addition to the one at Byker, and in 1722 was granted a patent for his own design.[52]

The accounts indicate that the construction cost of wagonways and steam engines was very large. According to Cromar, only the large coal-owners such as the Bowes had sufficient resources, and 'the need to safeguard these investments encouraged the development of the Regulation, an arrangement to regulate output and

hence prices.'[53] Landowners acting in combination to regulate the coal trade, was an important feature of the period. The Grand Allies held sway as the dominant combination from 1726 to 1770, when they were supplanted by the 'Limitation of the Vend'. The Grand Allies were a grouping of three landed families (Liddell, Wortley and Bowes) and a subsidiary party (Cotesworth). Their dual objectives were to concentrate capital for the purpose of joint-stock mining, and to raise the price of coal. They achieved the latter by blocking entry to the Tyneside coal industry through a systematic policy of acquiring collieries, wayleaves and land necessary for wayleaves. Map 1 illustrates the importance of wayleaves as the collieries moved further from the Tyne. In 1739 Thomas Slaker, a viewer, said that the denial of wayleaves was the main reason for the large number of unworked collieries in the region.[54] The Grand Allies aimed to control a large enough proportion of total output to force the other coal-masters to agree to its regulation; and by 1750 they controlled sixteen of the thirty-one working sea-sale collieries north and south of the Tyne in addition to much of the land to the south.[55] Their power was weakened after 1750 by improvements to the steam engine, which allowed the further development of coal mining north of the Tyne, in regions outside their control. The Grand Allies were still the most powerful grouping after 1750, but no longer enjoyed a '*de facto* monopoly'.[56]

Regulation of the Tyneside coal industry was not a new phenomenon. In the seventeenth century it was the Newcastle Company of Hostmen that had controlled the industry. An agreement in the Ridley papers provides evidence of early restrictive practices. On 27 April 1665 'several of the principal traders in coals' in Newcastle, agreed to work no further coals:

> until the coals now at pits and staiths that are merchantable be so near vended that the trade may be supplied with fresh and merchantable coals.[57]

Hostmen were originally those members of the Newcastle Company of Merchant Venturers who specialised in the shipment of coal.[58] The acquisition by Newcastle merchants in 1583 of the 'Grand Lease' of Whickham and Gateshead - 'here could be found proven collieries of unparalleled richness and ideal location' - gave impetus to the hostmen who were incorporated as a separate company in 1600.[59] Control of Whickham and Gateshead allowed the hostmen to push up the price of coal, and in 1595 they were accused of closing down some collieries in order to do so. Although the Grand Lease was subsequently assigned to the Newcastle Corporation, in return, the hostmen were granted their own charter allowing them exclusive rights to trade in coal from Newcastle.

> Only hostmen could deal in the coal trade. Hostmen would not buy from non-members, with the result that only hostmen found it profitable to become partners in local mines. Their shrewd concessions permitted them to retain what was close enough to a free hand in the supply of coal to the markets of southern England, as was to be evident on a number of future occasions when in the face of the vicissitudes of the trade they attempted to regulate production, restrict competition among themselves, and keep up prices.[60]

The Grand Allies were following in this tradition. Flinn and Stoker contended that the scale of coal mining in the north-east coupled with the high proportion of output sent to London encouraged monopolising tendencies at both the London end of the market and amongst the Tyneside coal-owners.[61] Another factor leading to restrictive practices was the relatively small number of major producers. The first formal 'Regulation' by the Tyneside coal-owners, attempting to raise price by restricting output, commenced in 1708 and lasted until 1715. The Grand Allies were not always successful in promoting the Regulation which periodically collapsed. They themselves were prone to disagreement. In 1730, for example, George Bowes unilaterally cut prices. Other major coal-owners such as the White-Ridleys attempted to stay out. The White-Ridleys' withdrawal from the Regulation brought about its collapse in 1735, although debts forced them to join a new one in 1747.[62] Despite the

set-backs, regulation of output remained an important theme throughout the eighteenth century.

The north-east's collieries enjoyed a high reputation for technical progress and business organisation,[63] which encouraged others to copy and resulted in the dissemination of knowledge to other areas. Pre-eminent in the dissemination of colliery practice were the viewers (mining engineers/consultants), whose influence spread outwards from the north-east to other parts of Britain and overseas during the eighteenth and early nineteenth centuries.[64] There was notable growth between 1550 and 1700 in the number of these professional mine experts, who acquired their knowledge through first-hand experience, and were not permanently attached to particular enterprises.[65] Although relatively little is known about them in the early eighteenth century, later viewers such as John Buddle (jnr.) are well known. Their notability and expertise caused them to be surrounded by schools of apprentices.[66] Amongst the tasks which they performed was the provision of expert opinion for forecasting. Many of the accounts that the thesis considers were prepared by viewers.

The connection between Tyneside and Scotland appears particularly strong. In 1724, for example, Sir John Clerk of Penecuik travelled from Edinburgh to see how mining was carried on around Newcastle.[67] There he met Martin Triewald, the Ridleys' steam engineer.[68] Duckham traced the involvement of Tyneside viewers north of the border, and concluded that a significant feature in the development of coal mining in Scotland during the eighteenth century was 'an ultimate dependence on English experience'.[69] In 1709, for example, the sixth Earl of Mar sent his colliery manager to Newcastle to obtain drainage plans, and in 1754, William Brown, the Tyneside viewer, supervised the installation of an underground railway at Bo'ness Colliery on the Duke of Hamilton's estates. Financial expertise was also available. In 1750, Amos Barnes, who had been appointed viewer at Heaton by the Grand Allies in 1730,[70] estimated the cost of winning Grange Colliery, near Bo'ness, at £1,557.[71]

The accounting records of north-eastern landowners have a wider significance beyond their regional interest, in view of the involvement of viewers on their estates.

Brief history of estate accounting [72]

Eighteenth century estate accounting was based primarily on the charge and discharge statement, which rendered individual stewards accountable to the estate. There are many examples including the Cokes' estate in Norfolk, the Dudleys' estate in Staffordshire and the Duke of Norfolk's estates in South Yorkshire.[73] The system was not confined to estates, but was used by English merchants from the sixteenth century to render overseas factors accountable to the principal.[74] In Scotland it was used by government accountants in the fifteenth century.[75]

Charge and discharge accounts emerged in England on the great Church estates of the thirteenth century, such as Canterbury, Winchester and Durham, and persisted as the dominant form of estate accounting into the modern era.[76] The scheme of accounting cited by James as prevailing 'all through the estate organization' of the earls of Northumberland between 1562 and 1637 (Figure 1) was virtually identical to the standard form used in the thirteenth century, as described by Harvey.[77]

Figure 1 Account of a reeve on the Northumberland estates 1562-1637 [78]

Arrears
Rents and Farms
Other Receipts

Total (The Charge)

Expenses
Money delivered

Total
The Balance (Remainder)

The charge and discharge system entailed charging the steward's account with receipts of cash or goods, and discharging it with disbursements and remittances to the proprietor. The steward was held accountable for the arrears of rents due but not collected, which formed part of his charge. The main purpose of the account was to prove that the steward had acted honestly and diligently. Essentially the scheme remained the same in the eighteenth century, except that it was more common to use a bilateral format, with charge on one side and discharge on the other, than the vertical format shown in Figure 1.

Charge and discharge accounting had been used on Roman estates in the ancient world; and it is possible to trace a continuous, if tenuous, line of development between the first and eighteenth centuries. In England, written accounting procedures appear to have commenced on the great Church estates in the first half of the thirteenth century. Their appearance was linked by Harvey to the spread of *demesne* farming.[79] On the Continent, written accounts were evident in the *Capitulare de Villis*, a series of instructions for the management of the royal estates, inspired by Charlemagne at the end of the eighth century.[80] In both instances there is evidence of earlier antecedents having influenced contemporary practice, although Harvey believed that oral accounting procedures supported by counters and tally-sticks remained the norm in England until the mid-thirteenth century.[81]

The *Capitulare de Villis* is the most important of a series of surviving documents that provide an insight into the organisation and management of the great estates of Charlemagne's Empire. It was intended to correct abuses that had crept into the administration of the royal estates.[82] Although Ganshof doubted that it was universally applied,[83] more recent work suggests that surveys of ninth century royal estates on the Continent were not uncommon.[84] Latouche commented on its haphazard nature,[85] although two types of accounting can be distinguished. The first is a type of charge and discharge accounting, whereby the steward was rendered

accountable for the difference between the income of his district and his payments, in goods or money.[86] These accounts were subject to audit.[87] The second, which is evident in the capitulary's requirement for stewards to submit an annual account of their districts' produce for the year, classified by type,[88] is more in the nature of a survey of possessions and revenues. Such surveys were described as *polyptyques* or *descriptiones* in the Carolingian period. The juxtaposition of estate survey and charge and discharge accounts in the *Capitulare de Villis* suggests that both these forms of accounting went together. This impression is corroborated by similarities between the *Capitulare de Villis* and another capitulary known as the *Brevium Exempla* that dealt specifically with estate surveys.[89]

It is difficult to tell the extent to which the *Capitulare de Villis* was an innovation, as opposed to the encodement of established practice. The capitulary is pre-dated by a seventh century *polyptyque* from the abbey of St Martin of Tours, which listed the names of the tenants grouped in localities together with the yields owing to the monastery.[90] The chance survival of this particular document - fragments of it were used in a bookbinding - suggests that such returns were not necessarily retained on a permanent basis, and implies the existence of others which were discarded.

Were the Carolingians influenced by Roman estate-practice? The main aim of Roman estate accounting was, after all, to expose any losses due to the dishonesty or negligence of officials,[91] which is consistent with the spirit of the *Capitulare de Villis*. Jack suggested that the Carolingians would have been aware of Roman practice through the parables in the New Testament.[92] However, it is likely that there were other more direct sources. First, there is the possibility that Roman estate-practices never ceased. Authors have commented on the ready integration of the incoming Germans into Gallo-Roman country life, following the collapse of the Western Empire;[93] witness the continued use of *coloni* (small farmers tied to the land) instead

of slaves, which was an important feature of the late Empire.[94] According to Geary, there was also continuity with late Roman field division, agricultural techniques and manorial organization.[95] Second, reference material existed in the form of preserved classical texts. The Carolingian court and the monasteries associated with it made a concerted attempt from the late eighth century to preserve classical knowledge through the collection and copying of ancient material from Italy.[96] For example, the name forms of the plants and animals listed in the *Capitulare de Villis* and the *Brevium Exempla* correspond to Greek and Latin glossaries that had been developed from classical sources.[97]

Amongst the texts that were copied at this time were Columella's first century textbook on agriculture and Pliny the Elder's *Natural History*. Like the *Capitulare de Villis*, both these authors wrote about large estates that were dependent on stewards for their efficient management, rather than the direct involvement of the owners.[98] Columella made various references to the estate-steward submitting charge and discharge accounts to the master, but did not deal with the subject explicitly.[99] The assumption seems to have been that such accounting was taken for granted. Columella gave a fuller account of the other duties and responsibilities of estate-stewards, which were also touched on by Pliny.[100] In this connection, Pliny is most significant because he alerted the reader to Columella's existence, by quoting him as a source for the sections of his work on agriculture.[101] Correspondence between Alcuin and Charlemagne in 798 and 799 indicates that Charlemagne had access to Pliny's *Natural History* in the court library at Aachen.[102] It follows that Charlemagne, with his interest in rationalising his estates, might also have known about Columella's work, which was circulating at about this time. Copies of *Columella* were made at the abbeys of Corbie and Fulda, and the text was also known at Tours and Reichenau.[103] Bischoff dated the Fulda manuscript to the 830's, and believed that it might derive from an earlier copy in the court library.[104] Therefore, there is a reasonable chance that the text was known to either Charlemagne or his successor, Louis the Pious.

According to Louis' anonymous biographer, he also had an interest in estate reform.[105] It is not suggested that the detailed arrangements in the *Capitulare de Villis* were drawn verbatim from *Columella*, but that the underlying Roman idea of stewardship coupled to accountability, might well have been.

If continuity with Roman practice in the *Capitulare de Villis* is a possibility, what about continuity with later generations? Continuity is evident in the tradition of the Carolingian estate survey that was preserved by the Church in the ninth century, and transmitted to England in the tenth.[106] There are indications that the practice of surveying estates in England increased as a result of the tenth century monastic reform movement. English monastic reform depended on European houses, which provided models for both spiritual living and estate management.[107] In the late ninth century, King Alfred attempted to revive organised monastic life in England, which had declined. True revival occurred from the middle of the tenth century, however, and was inspired by reformed Benedictine observance on the Continent.[108] The spiritual and temporal aspects of the monastic reform movement are illustrated by the life of Bishop Ethelwold, one of its prime architects. As a monk himself, he was concerned to promote religious observance; but this required the building and decoration of elaborate churches and precincts, together with the acquisition and efficient management of estates to support the new foundations.[109]

Corroboration that the European practice of surveying estates was disseminated to England at this time exists in the form of a handful of surviving documents from the tenth and eleventh centuries, showing English monasteries surveying their estates and compiling lists of stocks, treasures and sources of income.[110] An example relates to Ethelwold's revival of the great monastery of *Medeshamstede* at Peterborough in around 963.[111] The mention of monastery inventory records by Asser in his Life of Alfred [112] is further evidence of this trend, if Smyth is correct that the work is a forgery emanating from Ramsey Abbey in the early

eleventh century.[113] Kelly maintained that it was common practice by the eleventh century for the great monastic houses to keep detailed records of their estates, tenants, rents, stock and disbursements.[114] If it is true that the valuations contained in Domesday Book were based on estate surveys compiled by estate stewards,[115] the underlying technical expertise was already in place in England before the Norman Conquest.

The adoption of European estate practice in England in the tenth century raises the question of whether this included charge and discharge accounting, as this seems to have featured in Carolingian estate practice, alongside the survey. The chances of estate surveys surviving were relatively good, as they were intended for use on an ongoing basis. Consequently they were copied into cartularies or registers more readily than other manorial records such as charge and discharge accounts.[116] An alternative approach to the question of why charge and discharge accounts emerged in England in the thirteenth century, therefore, might be to consider those factors that would have led to their preservation as opposed to their origin.

The estate surveys that have survived from the pre-Conquest period tend to fall into the category of *customals*, because they recorded the customary obligations of the estate's tenants, in money, labour or produce. Like manorial charge and discharge accounts, the incidence of these documents rapidly increased in the thirteenth century with the spread of *demesne* farming. It follows that from the thirteenth century, it is sometimes possible to check the theoretical obligations of the tenants recorded in *customals* against the figures in the charge and discharge accounts.[117] The juxtaposition of estate survey and charge and discharge accounts survived into the modern era, and was evident on the Bowes estates in the eighteenth century. Surveys of estate cultivation listed the fields at Gibside by tenant, acreage, crops grown and rental value, whereas the charge and discharge accounts, supported by the rentals and rent ledgers, monitored and recorded the rents received.[118]

From the Middle Ages, the charge and discharge system was also used to record colliery operations on estates. This was true of the estate accounts of the earls of Northumberland in the sixteenth century.[119] Hatcher cited other examples at Kilvey, in the Gower peninsula, in the fourteenth century, and the mines of the bishop of Durham at Whickham, Railey, Grewburn and Hargill in the fifteenth and sixteenth centuries.[120] According to him, the system persisted as the only form of accounting in many collieries as late as the 1670s. Generally, however, charge and discharge accounting proved inadequate in itself for dealing with the complexities of coal mining, and a range of other types of report evolved containing a common 'core of vital data on costs, output, and sales'.[121] 'Coalpit' and 'sinking books' were maintained on the Willoughbys' estate at Wollaton in the sixteenth century, for example, which analysed output, sales and production costs, and supplemented the traditional charge and discharge accounts. The coalpit books recorded cash received from sales and cash paid to the *stevers* (overmen) as well as the physical quantities of coal produced, sold and held in stock. The sinking books itemised the cost of sinking new pits.

> From the Coalpit Books and Sinking Books, kept by the pit-reeve, were ultimately derived the charges and discharges in the annual compoti, relative to mining. They also enabled the pit-reeve to control the operations of the stever, or overman, of each pit.[122]

Again, this diversification mirrors the experience of the Bowes estates in the eighteenth century, where there were many different types of coal, lead and salt accounts, including the traditional charge and discharge statements.

Notes

1 McCord, 1979: 15

2 Levine & Wrightson, 1991: 9

3 ibid: 2; Lomas, 1996: 96

4 Levine & Wrightson, 1991: 7

5 Flinn, 1962; McCord, 1979: 13-15

6 Wood, 1910: 106

7 Chartres, 1977: 25, 28, 35

8 ibid: 35

9 Wood, 1910: 70, 140

10 Ellis, 1976: 139

11 Ridley, 1962

12 Flinn, 1962: 117

13 DRO: D/ST/C2/3/13/3

14 Fleischman & Parker, 1992

15 Scrivenor, 1854: 84; Flinn, 1962: 4

16 Flinn, 1962: 101, 106, 116-18

17 James, 1984: 69

18 Bennett et al, 1990: 20

19 Hughes, 1952: xvi-xviii

20 e.g. Hughes, 1952: xvi-xviii; Cromar, 1978

21 Bennett et al, 1990: 5; Clavering & Rounding, 1995

22 Ashton and Sykes, 1964: 194; McCord, 1979: 36

23 Clavering & Rounding, 1995: 265

24 DRO: D/ST/B1/6/96-97

25 NRO: 3410, GA/2, part 1: 16, 78, 82

26 Ashton & Sykes, 1964: 9

27 Hatcher, 1993: 264-71 & 301-6; Oldroyd, 1996

28 Ward, 1971: 104

29 Wills, 1995: 11

30 ibid: 8

31 ibid: 11

32 ibid: 63, 65

33 Gill, 1980; Wills, 1995: 1

34 Ridley, 1962 & Introduction to Ridley (Blagdon) MSS

35 ibid; Wallace, 1862: 12, 25-28, 102-112; Welford, 1895: 317-322; Baldwin, 1929: 12-30; Ridley, 1961; Sullivan, 1971; Bennett et al, 1990: 110

36 Levine & Wrightson, 1991: 62

37 ibid: 59-65

38 Atkinson, 1980: 36

39 Cromar, 1978; Flinn & Stoker, 1984: 21-22

40 DRO: D/MRP/77/24

41 Bennett et al, 1990: 16

42 Levine & Wrightson, 1991: 49

43 ibid: 71

44 ibid: 73

45 ibid: 50

46 Galloway, 1898: 236

47 Smith, 1978

48 NRO: ZR3/23/1

49 Flinn & Stoker, 1984: 120

50 Raistrick, 1938: 131

51 ibid: 133

52 Lindqvist, 1984: 184-203

53 Cromar, 1975: 69

54 Flinn & Stoker, 1984: 161

55 Ashton & Sykes, 1964: 212; Cromar, 1978;
Flinn & Stoker, 1984: 40, 161, 256-8

56 Cromar, 1975: i, 125

57 NRO: ZR1/35/25

58 Levine & Wrightson, 1991: 15

59 ibid: 16; Hatcher, 1993: 252, 513

60 Levine & Wrightson, 1991: 21-2

61 Flinn & Stoker, 1984: 256

62 Cromar, 1978: 202, 206

63 Flinn & Stoker, 1984: 18

64 Pollard, 1965: 127; Hiskey, 1979: 17

65 Nef, 1932: 421-2

66 Hiskey, 1979: 8-9; Flinn & Stoker, 1984: 57-9

67 Atkinson, 1966: 16

68 Lindqvist, 1984: 203

69 Duckham, 1969 & 1976

70 NRO: 3410, GA/2, part 1: 63

71 NRO: 3410, WAT 1/5/1

72 Some of the material in this section is drawn from Oldroyd, 1997.

73 Raybould, 1973: 230; Parker, 1975: 6; Medlicott, 1981: 196

74 Oldroyd, 1998

75 Chatfield, 1977: 25-6

76 Baxter, 1980; Napier, 1991 & 1997; Harvey, 1994: 91-2

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87 ibid: clause 28

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91 de Ste. Croix, 1956: 38

92 Jack, 1966: 143

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94 Latouche, 1967: 18, 71, 182

95 Geary, 1988: 96

96 Reynolds, 1983: xxi-xxv; Bischoff, 1994:94-5

97 Metz, 1960: 32-43

98 Columella, XII, preface 10

99 ibid: I, viii, 4, 13; XI, i, 24; XII, iii, 7

100 ibid: I, vii-viii; XI; XII; Pliny, XVIII, vii-viii

101 Pliny, XVII-XVIX

102 Reynolds, 1983: 309-10; Bischoff, 1994: 57

103 Wallace-Hadrill, 1983: 336-7; Bischoff, 1994: 146, 148, 150

104 Bischoff, 1994: 150

105 Martindale, 1983: 132, 159-60

106 Campbell, 1986:164

107 ibid: 165-6; Loyn, 1986: 6

108 Godfrey, 1962: 294-309; Loyn, 1991: 251

109 Yorke, 1988: 5-7

110 Campbell, 1986: 165, 173

111 Robertson, 1956: XXX1X

112 Asser: 81

113 Smyth, 1995: 366

114 Kelly,1990: 51

115 Godfrey & Hooper, 1996: 38, 46

116 Harvey, 1984:15

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118 DRO: D/ST/E5/14/31

119 James, 1955: xliv

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3

ESTATE ORGANISATION AND REPORTING NEEDS

Role of the proprietor

Map 2 shows the main locations of the Bowes estate operations in County Durham, and the stewards who were responsible for the various activities. The three main estates were located at Gibside in the north of the county and Streatlam and Wemmergill in the south. Each of the estates acted as the centre of a pool of activity. Gibside was George Bowes' principal residence, and headquarters for all the estate operations. The dispersed locations of the various estates and associated activities meant that the proprietor could only control them at a distance, no matter how conscientious he was in visiting his properties. However, reliance on stewards, and on accounts to monitor them, did not imply that a proprietor had disengaged himself from estate business, providing he visited his properties regularly.[1] This obligation was stressed repeatedly in contemporary texts. Edward Laurence, for example, said that

> every temptation should be encouraged which tends to invite noblemen and others to visit their estates in person every summer; for, without such a presence, whatever others may think who have not a sense of it, I who know the misfortunes and losses that have happened by continued absence must *aver*, that nothing has tended more to the abuses and ruin of brave estates, than the lord's neglect of looking *himself* sometimes into his own affairs.[2]

These sentiments were echoed by a Board of Agriculture reporter for the North Riding of Yorkshire who observed:

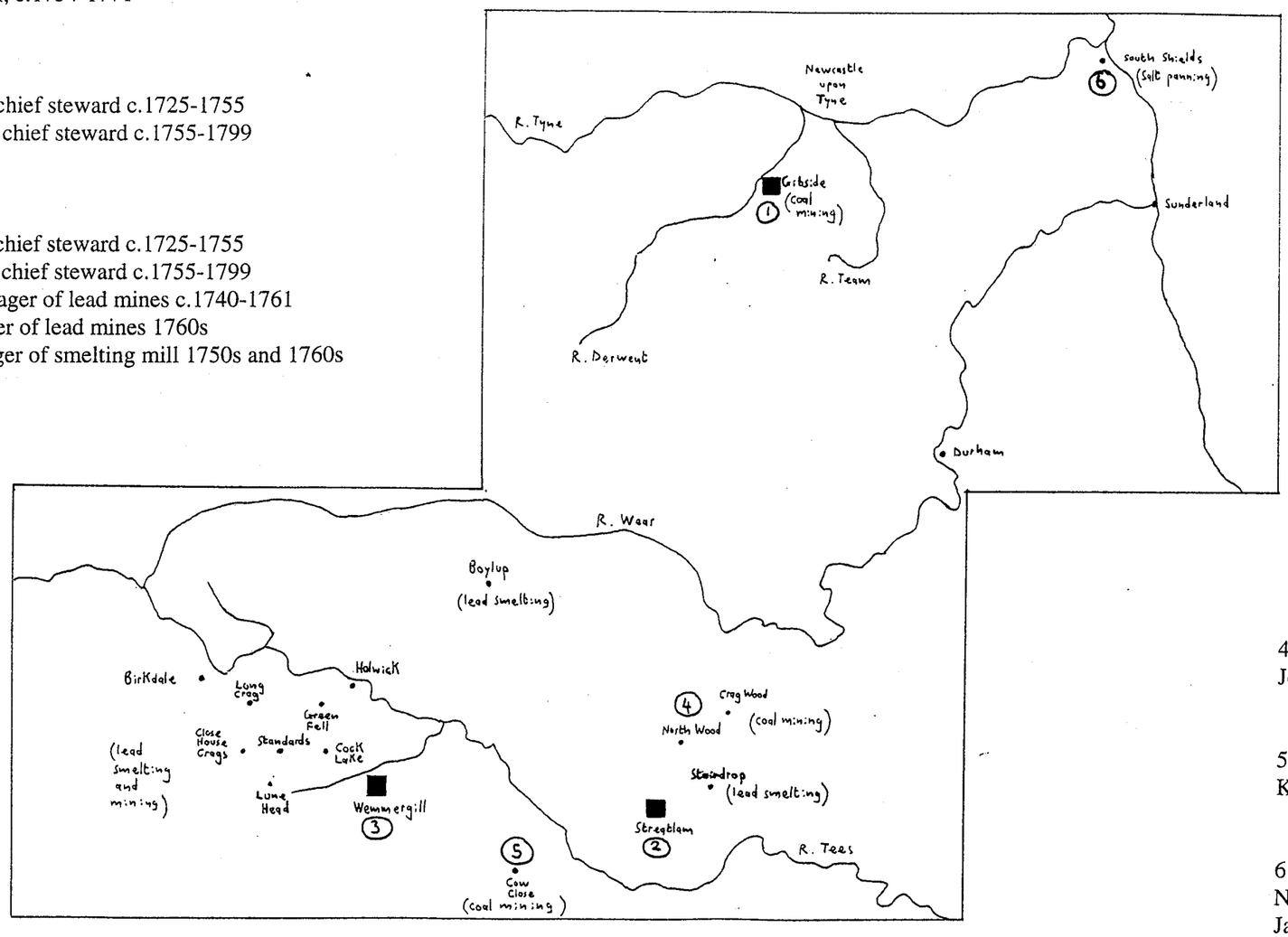
> those [estates] which are never visited by their owner, but abandoned to the care of a steward, perhaps a law agent, or other person still less acquainted with the management of land, and resident in London, are, as may naturally be expected, specimens of waste, neglect, barbarism, and poverty.[3]

Map 2 The Bowes estate operations in County Durham and network of stewards

1 Gibside
Anthony Leaton (snr.), chief steward c.1721-1725
William Leaton, chief steward c.1734-70 jointly with
Richard Stephenson, c.1734-1771

2 Streatlam
Thomas Colpitts I, chief steward c.1725-1755
Thomas Colpitts II, chief steward c.1755-1799

3 Wemmergill
Thomas Colpitts I, chief steward c.1725-1755
Thomas Colpitts II, chief steward c.1755-1799
Nathan Horne, manager of lead mines c.1740-1761
John Bourn, manager of lead mines 1760s
John Gibson, manager of smelting mill 1750s and 1760s



4 Northwood and Cragwood collieries
John Sedgwick, c.1759-1770

5 Cow Close colliery
Kay Coats, 1740s

6 South Shields salt pans
Nicholas Burdon, c. 1739-1749
James Miller, c.1742-1755
Thomas Kirkby, c. 1744-1760
William Thompson, c. 1760-1773

Portrait of George Bowes, by Enoch Seeman, 1744

He's about six foot in Height,
Wod he walk but upright...
His complexion is good...
His Mouth & Nose small...
His Eyes grey as a cat
Hansome Legs, Autre Chose,
And his Name is George Bowes.[4]

For most of the period under consideration, George Bowes was the proprietor in question (1722-1760). How active a manager was he? Bennett et al characterised him as an absentee landowner who preferred London society to industrial concerns.[5] His brothers' deaths had reluctantly 'dragged' the young socialite away from the Town in 1722; and he returned at the first opportunity. According to these authors, he fully merged all of his collieries with those of the Grand Allies after 1736, leaving himself free for a life of politics and culture.

It is true that George Bowes retained life-long passions for architecture, music, fox-hunting and horse-racing, and served as a Member of Parliament for County Durham from 1727 until his death,[6] but to portray him as disinterested in estate business is inaccurate. In the first place, the survival of separate accounts for George Bowes' colliery interests after 1736, such as at Cow Close (1742), Marley Hill (1750's), North Banks (1749) and Northwood (1750's), shows that they continued to be managed separately from the Grand Allies.[7] Kay Coats, the manager at Cow Close, was directly accountable to George Bowes. The Grand Allies were not involved in the management of the partnership at Northwood.

Second, George Bowes' correspondence indicates that he took a proactive role in the management of his estates. He received continual progress reports from his stewards when he was away in London, and replied by sending them instructions. He gave instructions to William Leaton, his chief steward, concerning the running of the Gibside estate, including the coal mines and coal shipments.[8] In 1723 Thomas Maynard, an agent at Steatlam, wrote to George Bowes in London regarding Charles Montagu's colliery lease.[9] In 1726 Anthony Leaton (snr.) sent him a progress report concerning the laying of two new pits at North Banks, and the building of a staith at Redheugh.[10] In 1731 William Leaton sent him an account of cash received during the last fortnight.[11]

The numbers of letters and degree of detail do not diminish after 1736 when he is supposed to have opted out of business life. Nathan Ridley and Nathan Horne sent progress reports of lead mining to George Bowes in London in 1737 and 1748. In 1751 and 1754 similar reports were sent to him at Streatlam Castle and Gibside.[12] In 1740 Bowes received details in London of the current farm livestock at Gibside.[13] Thomas Colpitts I, the chief agent for the estates at Steatlam and Wemmergill, wrote to him in 1743, informing him that he had visited the lead mines at Bollup at his command, and was enclosing a report on the state of the workings.[14] William Leaton and the viewer, Nicholas Walton, sent him various letters in 1747 concerning the prospects of new colliery winnings by the Grand Allies.[15] In 1757 William Leaton gave Bowes a progress report on the new winning of Mr Davison's colliery. He wrote that:

> If the new winning prove as may be expected to, it is certainly right to get a further [lease] term if can be got on reasonable terms .[16]

In 1759 an account of lead smelted was sent to Bowes at Gibside by James Sanderson. The emphasis in the letter on what had been produced and delivered by the mill during 'this account' suggests that he kept the proprietor informed on a regular basis.[17] In 1760 Anthony Hodgson, as 'ordered by Mr Leaton', sent an account to Bowes of the state of the workings at Carterthorne colliery and of a new drift being sunk at Northwood.[18]

The level of detail that was typical of these letters is illustrated by the following extract from a letter by Thomas Colpitts I to George Bowes in London in 1750:

.... I have made all the pays for our unprofitable lead mines, and Mr Ripon having appointed a day for Crinklehow I met him and we cleared off all expenses there and four of the workmen. A moyety of the whole charge at Crinklehow from the

beginning comes to £166.12.3$^{1}/_{4}$. From the trials hitherto made, it is impossible to say what may be expected from that mine. Nathan [Horne] says, she is hopeful; Mr Ripon keeps silent, and will say nothing either for or against her.

The Jacks [leases] at Standards, Arngill and Close House are all out [terminated/expired?]. The tenants who had them hitherto have not pushed so busily as they ought to have done. Only employing their vacant time they had to spare from their other business. We think to join some more hands to them.

Western (the Husher) [prospector] came here and asked for a jack to make trial for one year at $^{1}/_{6}$ duty [rent paid in produce], and then, if demanded to have leave for 14 or 21 years at $^{1}/_{5}$, according to the method used in granting jacks and leases, and to be subject to other usual covenants as are contained in leases for lead mines ....[19]

Although the letter gave a detailed appraisal of the lead mines, its tone was familiar; it was written to someone who had a previous understanding of the situation, and who knew the parties involved. One cannot be certain whether George Bowes was interested in this report, but it was certainly Colpitt's expectation that he would have been. Beckett observed a similar attention to detail, and knowledge of the day to day affairs of the estate, in the correspondence of absentee landowners in Cumbria in the early eighteenth century.[20]

Finally, spending time in London was necessary for business. According to Beckett, the same was true of the Lowthers of Westmoreland.[21] As an MP, George Bowes was able to lobby Parliament on behalf of the Newcastle coal-owners.[22] He banked with the London firm of Francis Child and Co., and some of the bank statements are annotated: 'Copye. The original Mr Bowes took with him to London'.[23] Newcastle coal was traded through Billingsgate in London. In 1730 William Leaton wrote to George Bowes concerning the payment of the premium to the London coal dealers. He feared that non-payment would be a 'very great prejudice' to his trade if his 'neighbours' paid it, and concluded: 'When you are at Billingsgate you there will be able to judge what is necessary to be done'.[24]

These references are not suggestive of a proprietor who eschewed control of his business affairs. Furthermore, George Bowes was an itinerant rather than absentee landowner, who travelled frequently between his homes at Gibside and London, and rented a house at Ledston, to act as a staging-post on the journey.[25] Whether or not the estate business depended on his active involvement at an operational, as opposed to strategic, level, is a separate question. The continuance of procedures following ownership changes implies that it did not. George Bowes acquired an established manner of practice, organisation and accounting when he inherited the estates in 1722, and the same applied to his successors. The lease of the Gibside coal mines to Charles Montagu (1692-1723) spanned several proprietors - Sir Francis Blakiston, Sir William Bowes, Lady Elizabeth Bowes, William Blakiston Bowes, and finally George Bowes - yet the format of the estate accounts remained the same.[26] This was also true of the colliery partnership at Northwood following George Bowes' death.[27] The estate officials too remained unchanged. William Leaton, John Sedgwick, Richard Stephenson, Thomas Colpitts II, John Gibson and Nathan Horne amongst others, all survived their master's death. The fact that Nathan Horne could be criticised by his fellow steward, John Gibson, for working the lead mines at Wemmergill instead of letting them (q.v. p. 175), implies that such decisions lay within a steward's responsibilities. Another example is a decision to sell lead ore rather than process it (q.v. p. 147), which was taken by William Leaton without recourse to the proprietor.

Ridleys

Some of the same facets are apparent in the Ridley papers. The letters of three generations - Richard Ridley, his son Matthew, and grandson Matthew White Ridley (1732-1782) - show that like the Bowes, they spent long periods in London, but maintained a continuous interest in business affairs, and corresponded regularly with their agents.[28] Given their mercantile background, it would have been surprising had they acted otherwise. Letter writing as a means of controlling the activities of agents

had been a regular feature of English commerce since the sixteenth century, and was an important part of a merchant's training.[29] Furthermore, their accounts show that when they were on journeys they took their business with them. For example, a pocket sized notebook (1740-44) has survived for Matthew White showing lists of receipts and payments whilst travelling, in addition to notes of bills received and property transactions juxtaposed with miscellaneous information such as shopping lists.[30]

Integration

George Bowes' active involvement in the day-to day operations of his estates, coupled with the geographical spread of his activities and his distance from events, necessitated a centralised organisational structure, that was capable of delegating responsibility to stewards in key areas, whilst, at the same time, retaining control at the centre. This was achieved through a unified reporting network. Returns from all the various activities and estates were ultimately channelled through the estate office at Gibside; and William Leaton and Richard Stephenson, the chief stewards there, were able to determine what they expected to receive. This was quite usual. According to Mingay, a central office presided over by a full-time official, was a common feature of estate management in the eighteenth century.[31] The office was normally situated in the proprietor's main residence. Here the accounts, correspondence and other returns were kept:

> In a well regulated office all contracts, agreements, letters, accounts and other documents were numbered and filed; and all oral agreements or messages immediately committed to writing. The steward's assistants and staff responsible for different parts of the estate kept their own rough accounts, which were periodically made up and inspected by the steward. Fair copies were subsequently bound into volumes. Separate totals were calculated for each kind of receipt and expenditure, and summaries of the accounts were prepared for the landlord.[32]

Mingay's description of a well regulated office applies exactly to Gibside. Many examples have survived of the returns that were submitted to the chief stewards there. Anthony Hodgson sent William Leaton regular reports of the progress of sinking a new pit at Northwood near Streatlam.[33] In 1760 Nathan Horne sent him an account of lead delivered from the smelting mill at Dunston Bank.[34] In 1762 Horne wrote:

> As for coming to Gibside I cannot come until the wether mend and the days grow longer and then I will come and bring my bargin book and all the workings and all the other papers belonging to you ...[35]

The agents, Joseph Pickering, James Miller, William Thompson and Nicholas Burdon all wrote to Leaton concerning the administration of the South Shields salt pans.[36] Joseph Pickering sent him monthly accounts of expenditure together with supporting vouchers.[37] He received details of sales from James Miller, Pickering's successor. The account for 1744, for example, showed a total of £484/17/6 in respect of 338 tons and 10 bushels.[38] Thomas Kirkby, another agent at South Shields (c.1744-1760), sent Leaton accounts of salt shipments.[39] Richard Stephenson too received a range of accounts through the post. Some of these reports detailed the quantities of lead mined and smelted.[40] Others related to the salt pans, and included accounts of stock, disbursements and deliveries. James Miller, for instance, sent him monthly lists of expenditure.[41] Leaton and Stephensons' correspondence was wide-ranging and covered the purchase of supplies, timber, building new kitchens, deliveries of goods, payment of bills, demolition of stables at Marley Hill, distraint of goods, working of collieries, wagonways, staff, tenants, labourers' pay, wayleave rents, pensions, debts, household supplies, crops and cases at the assizes, amongst a host of other items, including advice on the accounting procedures.[42] In August 1762, for example, John Bourn wrote to Leaton informing him of the arrangements he had put in place for controlling the operation of the lead subcontracting agreements, and requesting his approval, which was given by letter a week later.[43]

The division of responsibility between Leaton and Stephenson is unclear, although the fact that the balance on Stephenson's charge and discharge accounts was described as 'due to Mr Leaton',[44] suggests that Leaton had ultimate authority. Accountable only to the proprietor, these two stewards were in a position of considerable power. Leaton's importance in the estate organisation is illustrated by a letter in 1738 from Francis O'Neale, George Bowes' agent in London. Bowes had been negotiating terms with Henry Liddell and Edward Wortley in London to buy into their partnership at Heaton colliery. The colliery had produced 194,228 chaldrons of merchantable coal during the previous six years, which was nearly five times as much as the estate mines at Gibside.[45] A consideration of £7,900 had been proposed for a one third share, together with interest at 4 percent. O'Neale wrote:

> my master has rather consented than agreed to anyone of the articles. He is quite dissatisfied with the whole. But if you will answer that no more claims or difficulties may hereafter arise; then what is now done may be taken for granted to complete what we have so long devised.[46]

Therefore, final approval of the agreement, which O'Neale was enclosing together with accounts and computations, rested with Leaton. The ability of Leaton and Stephenson to influence procedures on the estates was enhanced by the length of their tenure, as they each held office concurrently for more than thirty-five years.

This centralised system of organisation and reporting probably explains why management and accounting practices were highly integrated over different activities. For instance, the farm tenants and colliery subcontractors at Gibside were dealt with in a similar way. Both made use of the estate's horses, and were recharged through control accounts. Just as the subcontractors' accounts were charged with equipment provided by the estate, such as pit props (q.v. p. 95), so too were the farm tenants. Their accounts were debited with a variety of items, including fire-coals, leading hay

to the farm, household goods, repairs and improvements, hedging and supplies of grain.[47] Separate accounts were kept of deliveries of barley, wheat, rye and hay to the Gibside tenants.[48]

These particular examples illustrate a common facet of the business arrangements, that the estates acted as a resource-pool to facilitate production that otherwise would not have taken place. The provision of a new engine for a paper mill at Gibside is another instance. Here, the initial capital cost was borne by the estate and recouped through the rent.[49] When the lease came up for renewal in 1761, the tenants again looked to the estate to make the necessary improvements to correct the 'ruinous walls' and 'failing working movements' of the mill.[50] The fact that production was often undertaken by subcontractors and tenants rather than the estates directly is typical of other estate enterprise at this time.[51] Wordie, for example, wrote that in 1748 the 'entire industrial development' of the Leveson-Gower estates in Shropshire and Staffordshire was 'in the hands of private entrepreneurs'.[52] However, a schedule comparing the profitability of leasing or working the Bowes' lead mines at Wemmergill in 1758 (q.v. p. 175) illustrates that leasing an operation could be perceived as economically the best option, and was not necessarily an indication of an aversion to risk or lack of entrepreneurship.

Another factor encouraging integration on the Bowes estates was the tendency to assign management responsibility by location rather than activity. Although John Bourn's main remit was lead mining, his correspondence with William Leaton shows him purchasing forty-three 'weather sheep' to send to the estate at Streatlam.[53] John Sedgwick, the manager of Northwood colliery, also managed the farms at neighbouring Toft Hill and Ramshaw, and accounted for both colliery and farms together. He used the same account book for both enterprises, but kept the details separate.[54] This was the case for the Ridleys. Their colliery at Jesmond, for example, was managed by Thomas Shields, who also managed three farms in the vicinity on

their behalf.[55] Whether this kind of doubling-up of role was possible may have been influenced by the size of the undertakings, as it was not universal. At Wemmergill, for instance, the Bowes' lead mines and smelting mill were managed separately, despite the common location.

Technical characteristics

Generally, the Bowes accounts were based on the bilateral recording of cash receipts and payments, with adjustments for opening and closing debtors, creditors and stocks as appropriate. There are many examples. The establishment accounts of the Gibside estate for the period 1745 to 1753 were kept in bilateral format,[56] as were the 1740 charge and discharge accounts of Thomas Colpitts I, agent for the estates at Streatlam and Wemmergill.[57] The latter were adjusted for the rent arrears owing by tenants. The bilateral charge and discharge accounts of John Sedgwick, manager of Northwood and Cragwood colliery, took into account moneys due in respect of 'coals sold on trust [credit]'. Figure 2 includes details from the account for 1770. The

Figure 2 Abstract of John Sedgwick A/C end of 31st December 1770 [58]

1769			1769		
31 Dec	Arrears then due	209. 6.10	31 Dec	Balance	19.3.9
1770	Coals sold on trust			Cash paid this year	
31 Dec	this year	135.14. 5		for working coals	
				as per coal book	517.15.1
	Cash received this			Arrears unpaid	
	year as per			1755 ...	
	cash book	406. 9. 3		1756 [etc.]	
	Balance due	22. 2. 6		1770 135.14.5	
					236.14.2
		773.13.0			773.13.0

opening and closing balances of debtors were derived from a separate schedule, that was adjusted for any moneys received during the year.[59] Generally, debtors were either recorded in schedules, or, more permanently, in ledgers, such as the Gibside debt book, 1748 to 1751.[60] Both methods were used at the South Shields salt pans to record the cottagers' rent arrears.[61]

Physical stock checks, and stock reconciliations were carried out regularly, which is not surprising given the importance of mineral extraction to the estates, and stock was included in profit calculations, such as one for Marley Hill colliery in 1772 (q.v. p. 136). Coal was measured both at the pit-head and when it was led away to the staith, and the two quantities were reconciled (q.v. p. 92). There are many examples where the coal resting at the various pits was quantified, as at North Banks colliery in 1734 (Figure 3).

Figure 3 A computation of the stock of coals in North Banks colliery lying over the year [62]

	Tenns		
Riding Pitt	40		
Thistle Pitt	70		
Corn Pitt	45		
	155		
		Tenns	
Hutton		155	
		80	
Green Pitt	62		
Watch Pitt	18	235	
	80		

As far as lead was concerned, it differed from coal in that there were two distinct production processes (ore extraction and smelting) that were carried out in

different locations. Consequently, accounts were needed to control the transfers of stock between the two. In November 1741, for example, a schedule was addressed to William Leaton certifying the various deliveries of ore from the mine at Isabell Meah Hill to the smelting mill at Boylup. Each of the deliveries was recorded separately by carrier.[63] A similar schedule has survived for the period 1 August to 14 November 1741, analysing the deliveries by mine. For example, a delivery of 23 bing/2 horse of ore from the Standards mine to the Boylup mill was recorded at a cost of 5s a bing.[64]

It was also necessary to keep track of the stocks of finished lead. Figure 4 is a stock schedule prepared by John Gibson, the manager of the smelting mill at Wemmergill. As well as listing the stocks on hand, the schedule reconciled them to

Figure 4 Wemmergill smelt mill stock at 31 December 1757 [65]

Lead ore to smelt		90 bings
Lead smelted and remaining at mill		264 pigs
(which with the 236 delivered make 500 the quantity smelted)		
Fuel	(Coal	15 loads
	(Lime	10 do
	(Peats	30 carts

the number of pigs produced and delivered. Some of the finished lead was shipped from the Tyne. Accounts were needed to ensure none of it went astray, and in 1742 an account was prepared reconciling the quantity of lead delivered to George Bowes' staith at Dunston over the previous two years to the quantities sold or still in stock (Figure 5). Separate schedules itemised the various deliveries to and from the staith making up this account.[66] Like the smelting mill account in Figure 4, its purpose was to prove that all of the stock could be accounted for.

Figure 5 An account of lead received at George Bowes' staith viz in the year [67]

1741	Pieces	871	
1742	583		
	1054		
	48		
	15		
	52		
	8		
	___	1760	
		___	
		2631	
		___	

Sold and delivered in part of the above viz

[Various sales listed in date order ....]

___	
722	Delivered
1909	Resting
___	
2631	

Although most of the farming on the Bowes estates was undertaken by tenants, the estates did farm some fields directly. Therefore, stock control was important here also. An inventory of the 'stouckes of corn' at Gibside has survived for 1729.[68] A statement showing the quantities of corn and hay sown and harvested at Gibside and neighbouring Hollinside was prepared for the period 1735 to 1740. One side of the document itemised the quantities of corn sown by supplier, place of purchase and field. The reverse listed the quantities harvested by field.[69] Numbers of livestock were also recorded.[70] Much of the harvest was produced for use in the coal mines at Gibside, and accounts were kept of the internal transfers of oats, rye and straw for the underground and overground horses.[71] In 1744, for example, a schedule was prepared of the hay stocks at Gibside by location, including the pits. Timber was also essential in the mines, and delivery books recorded the quantities of props, sleepers etc. delivered from the woods around Gibside to the pits and staiths.[72]

Did the Bowes estates make use of double-entry bookkeeping? The bilateral recording of receipts and payments is much in evidence, but this is not the same. A double-entry system involves the use of a ledger that is kept constantly in balance, containing *nominal* accounts (revenues, expenses, assets), *personal* accounts (debtors and creditors) and a *capital* account (proprietor's stake in the enterprise). Double-entry accounting has become an issue for historians because of the early twentieth century writings of Werner Sombart and Max Weber. Sombart claimed that double-entry was instrumental in the development of capitalist enterprise. Not only did it impose accuracy, knowledge and system on business structures, but it identified the rationalistic pursuit of profits as the main aim of business. These views were echoed by Weber. For him, double-entry was a manifestation of the rise of *rationalization* within society, which he considered essential for the growth of capitalism.[73] The main challenge to the Sombart-Weber thesis comes from archival researchers who argue that its claims are unsupported by reality. They maintain that early double-entry accounting was far more rudimentary than Sombart and Weber had supposed and that it was not widely practised in British industry prior to the nineteenth century. Writing about coal, Hatcher summed up the views of the objectors:

> The experience of the early modern coal industry lends no support whatsoever to the hypothesis that scientific (double-entry) bookkeeping was essential to the formulation of rational business policies or the systematic organization of industrial ventures.[74]

The only unequivocal evidence that double-entry was employed on the Bowes estates is a pro-forma scheme of partnership accounts for lead mining and smelting, discussed below (q.v. p. 73). Another possible instance is a 'General Account for Gibside Colliery for One Year Ending April 29th 1693', which is reproduced in Figure 6 and summarised in Figure 7. This report relates to the lease of Gibside Colliery (1692-1723) by Sir Francis Blakiston to Charles Montagu, whom Hatcher described as

Figure 6 General account for Gibside colliery for one year ending April 29th 1693 [75]

Figure 7 Summary of the general account

General Account

Colliery expenses	£3,069	Sale of coals	2,375
		Stock at staith	5
		Stock at pits	552
		Owing by fitters	115
		Wayleaves prepaid	7
		Cash lost to balance A/C	15
	£3,069		£3,069

Colliery Stock Account

Capital:		Stock at staith	5
2/3 Charles Montagu	500	Stock at pits	552
1/12 Thomas Fenwick	62	Owing by fitters	115
1/4 Thomas Rawlins	188	Wayleaves prepaid	7
		Other debtors	17
		1/16 part of John Frost's coal carrying vessel, the	
Other creditors	60	Recovery of Bridlington	100
		Cash lost to balance A/C	14
	£810		£810

the largest producer of coal on Tyneside at the turn of the seventeenth century.[76] The report constitutes the annual accounts of the lessee, who mined Gibside in partnership with Thomas Fenwick and Thomas Rawlins. These parties also had a financial stake in Montagu's other major colliery lease at Benwell.[77]

The General Account relates to the first year of the lease; there is a direct connection, therefore, between the term of the lease and the reporting period. This suggests that leasing may have provided an impetus for periodic profit measurement, in contrast to many other eighteenth century accounts. The lease specified that Charles Montagu was to pay a fixed annual sum in addition to a proportional rent, dependant on the quantity of coal 'led' (transported) from the mine, measured in 'tens'.[78] The ten was the standard unit of coal production. The rent is shown on the left side of the account as an expense. Expenses are treated as debits and revenue as

credits. The credit side includes cash received from sales and cash owing by the fitters. It includes the closing stock of coals lying at the pit, but not yet led to the staith (river-side construction for storing coal), in addition to wayleaves and rent prepaid. Quantities as well as values of coal led and subsequently sold are noted. The document contains a subsidiary 'colliery stock account', akin to a balance sheet, which reverses the sides of the general account. It lists closing stock and debtors on the right, and creditors and partners' capital, in percentage shares, on the left. The loss is shown on the right-hand side as a reduction of capital. The partnership's share of the coal-ship, the Recovery of Bridlington, is itemised in the colliery stock account as an asset rather than included in the general account alongside the other outlays. This separation of capital and revenue is noteworthy, as it was unusual in eighteenth century accounts.[79] To own a part-share of a coal-ship was not uncommon, as it enabled the owners to spread the risks of the ship floundering on the hazardous voyage to London.[80] Ellis suggested another reason. Part-ownership gave merchants some control over ships' movements, and in theory guaranteed space for their cargo.[81] Various bills of sale have survived showing that George Bowes too bought part-shares in a number of vessels.[82]

Is the 1693 Gibside colliery account an early example of a double-entry system, or is it is something else? There are a number of possibilities. It might represent a bilateral summary of a single-entry system. The adjustment of the income statement to take account of closing debtors, creditors and stock does not preclude this. The 1693 Gibside account may have been a hybrid of single and double-entry systems. Edwards observed that a combination of the two was often used in eighteenth century Britain.[83] Unfortunately, it is impossible to tell without the supporting ledger and day books. The reversal of the colliery stock account, or balance sheet, may corroborate the double-entry view. One theory to explain this reversal of assets, liabilities and capital, which has been observed in other seventeenth and eighteenth century balance sheets in Britain, is that it was an extension of the

double-entry principal of every transaction being recorded twice. Various contemporary textbooks advocated the listing of the closing balances in reverse order when a ledger was closed, to mirror their transposition into a new ledger in the original order.[84]

Double-entry accounting appears to have been the exception on the Bowes estates, however. The bilateral recording of cash transactions was probably preferred because it was simpler and more versatile. A variety of statements could be prepared from the cash books, in addition to the traditional charge and discharge account. Such accounts recorded the charge and discharge of a steward's obligations, and the balance for which he was still accountable. All of the Bowes stewards kept charge and discharge accounts, such as Anthony Leaton (snr.) who produced them annually at Gibside,[85] or Thomas Colpitts I at Streatlam.[86] The accounts of James Miller, the agent for the South Shields salt pans (c.1742-1755), are another example.[87] However, charge and discharge accounts were not the most common type of report, owing to the complexity of the estates' business arrangements. Chapter 4 will show how other types of accounts were needed to keep control of lessees, subcontractors and partners.

Accounting knowledge base

The existence of a centralised reporting network that was capable of dealing with different types of activity raises the question of who prepared the accounts, and where they acquired their knowledge from. In 1696 Charles Montagu, lessee of Gibside colliery, referred in a letter to 'good accountants' who could be obtained at an 'expense'.[88] This is an interesting reference for accounting historians, as it suggests that a class of professional bookkeepers or accountants were available for hire, as distinct from business managers, such as estate stewards. Perhaps the presence of a good accountant could explain the sophisticated nature of Montagu's own accounts. However, apart from the occasional involvement of outside viewers, neither the

correspondence nor the professional fees recorded in the cash books reveal the presence in the Bowes estates of accountants from outside.

If, as this suggests, most of the accounts on the Bowes estates were prepared by the stewards, what sources of guidance were available to them? First, a number of contemporary printed guides were available, although none of them encompassed the full range of accounts used on the Bowes estates. Charles Snell's *Accompts for Landed-men* (1711) was based on the bilateral recording of cash receipts and payments, and included a survey or rental, showing details of the tenants, property and annual rents. Thomas Richards' *The Gentlemans Auditor* (1707) set out a method for keeping charge and discharge accounts, supported by a double-entry ledger. Both of these guides produced annual summaries. Edward Laurence's *The Duty and Office of a Land Steward* (1731) was mainly concerned with non-accounting matters. It did incorporate a pro-forma survey, containing the names of the tenants, their farms and annual rents, in addition to pro-forma charge and discharge accounts. These were produced in bilateral form, and were analysed under a range of headings. Rents were accounted for on the basis of moneys received, so, unlike the Bowes accounts, arrears were not included. Perhaps the most comprehensive guide was Roger North's *The Gentleman Accomptant* (1714), which produced a full double-entry scheme with accounts that mirrored the organisation of the estate. It also contained a dictionary of accounting terms.[89] Charles Snell was described in his text as a 'teacher of writing and accompts at the free writing-school in Foster Lane with whom young gentlemen may board', suggesting the existence of formalised tuition in accounting procedures.

In addition to printed handbooks, there were also hand-written exemplars, such as one in the Bowes papers that was compiled around 1741 for lead mining and smelting, in double-entry format.[90] The document contains ledger accounts for cash, debtors, mill and mine charges, profit and loss (lead account) and partners' capital. In

view of its unusual nature, it is reproduced in full in Appendix 2. The following note was written on the final page:

> A good for nothing paper de[livered] to Streatlam as a curious precedent for keeping a smelt mill account per R.E.
>
> Approved of by T. Colpitts [chief steward at Streatlam] and recommended by him to the study and perusal of F.O.

Although such exemplars were not uncommon for merchants - Parker talks about the dangers of mistaking them for the real thing [91] - they were unusual for industrial enterprises. This particular exemplar is doubly rare, as there are few known examples of British industrial concerns using double-entry accounting prior to the nineteenth century.[92] The survival of annual profit and loss accounts for the period 1741 to 1746, presented in a similar format,[93] shows that the scheme was applied in practice. The accounts for 1741 and 1742 are included in Appendix 3.

'A method of a salt pan account' dated 1754 has also survived.[94] This was based on a bilateral cash account containing total figures for coals, wages, incidents and salt delivered. Separate schedules listed the transactions that made up these figures in chronological order. The account for coals analysed the deliveries over the various pits and quantified the keel dues. Again, actual accounts have survived for the period 1760-1766 in the same format as this pro-forma, indicating that it was applied in practice.[95]

Stewards also followed the practice of their predecessors. There are cash books for the Gibside estate covering the period 1728 to 1792, which were kept in the same format, despite a succession of different stewards.[96] The same was true of the North Blyth company, in which the Ridley family had a major interest. At least six different stewards there produced the same kind of rent schedules and summaries between 1747 and 1814.[97] Like colliery viewers, family dynasties of stewards were

quite common, and one generation was able to teach the next. For example, Thomas Colpitts II succeeded his father, Thomas Colpitts I, as principal agent for the estates at Streatlam and Wemmergill in 1755. Anthony Leaton (snr.) was a chief steward at Gibside (c.1721-25), as was his son William (c.1734-70). William's brothers Anthony (jnr.) and John were also agents on the estate.

Finally, a body of accounting expertise existed in the hands of colliery viewers, who were highly paid professional engineers. Edward Smith senior's terms for serving as a viewer at North Biddick colliery in 1728 were £50 a year plus settling on a farm in the owners' possession.[98] The Ridleys paid Richard Peck a retainer of £26 a year at Jesmond colliery from 1735 to 1737, when it was raised to £40, in addition to providing a house and free coal.[99] The Smith family were 'celebrated mathematicians', and viewers in general were well grounded in mathematics as part of their training.[100] They had been providing cost data for forecasting the profitability of mine workings from at least the early seventeenth century,[101] and some of the Bowes' stewards came from a viewing background. William Leaton, the chief steward at Gibside, was himself a viewer. The viewing expenses listed in the cash book for Northwood colliery showed that he carried out views there with Nicholas Walton in 1753 and 1754.[102] He also did work for the Grand Allies, according to their minute book, and for the Ridleys. For example, he and Nicholas Walton viewed the Ridleys' colliery at Jesmond in 1745,[103] and received another commission:

> to arbitrate between William Coulson of Jesmond and Matthew White of Blagdon and Matthew Ridley of Heaton as to the shakings and cracks in the mansion house, offices and garden walls of William Coulson [104]

William Leaton's father, Anthony had originally served as Charles Montagu's chief viewer at Gibside, before working for the estate.[105] William's brother John carried out a view on behalf of the Grand Allies at Gateshead Low Fell colliery, that incorporated a computation of the expense of winning it.[106] The involvement of

viewers on the Bowes estates was not unique. Newcastle viewers were also employed by the Lumley estate in County Durham and the Duke of Norfolk's estate in south Yorkshire.[107] John Curr, who published *The Coal Viewer and Engine Builder's Practical Companion*, served as the 'superintendent' of the Norfolks' coal-works from 1781 to 1801, and was succeeded by Charles Nixon, another Newcastle viewer.

A review of the viewers' records in the first half of the eighteenth century shows that estimating the output, costs and profitability of coal enterprise was a regular part of their work. John Barnes, who was later employed by the Grand Allies, prepared *ex ante* unit cost/profit figures for Fenham colliery in September 1717. Similar computations were prepared by Amos Barnes in 1734, 1735, 1736 and 1738 for various collieries.[108] The 1735 computation was prepared jointly with William Dagleish, and the 1738 one with Stephen Drydon and William Hepple. Richard Peck prepared *ex ante* unit cost/profit estimates in 1718, 1723, and 1726.[109] The 1726 computation was prepared jointly with Stephen Drydon. Nicholas Walton prepared *ex ante* unit cost/profit calculations in support of an estimate of working Long Benton colliery 1745-1747.[110] The notebook of Edward Smith (jnr.), a viewer at Houghton Colliery between 1749 and 1751, contains similar calculations of unit cost and profit, in addition to estimates of output over the remaining life of a pit.[111] These are merely examples, not a comprehensive list.

Such forecasts, which were based on the calculation of unit cost, had a long ancestry. A letter from Hugh Bird to the Duke of Northumberland in 1617 calculated the cost per ten of working and leading Newburn colliery and the weekly profit. Hatcher wrote:

> Although there are no surviving records, it is safe to assume that Hostmen coal-masters at this time made similar computations when seeking to assess the worth and prospects of their collieries, as we know they did later in the century.[112]

Calculations of unit cost were also enduring and can be found in the works of nineteenth century viewers. John Buddle's papers, for example, contain similar estimates, based on annual production, such as the calculation of the unit cost of working Harraton Moor Colliery in 1798, which was used to project total cost and total profit.[113] In October 1826 an estimate was prepared of the unit cost/profit of extracting 12,000 chaldrons of merchantable coal from the Low Main seam at Marley Hill colliery on the Gibside estate. The projection commenced by estimating that the total annual output necessary to produce 12,000 chaldrons of merchantable coals would be 16,000, as some of the coals would be too small for domestic consumption. It then went on to estimate the cost per chaldron at 15s/4.5d, which based on a selling price of 18s would yield a unit profit of 2s/7.5d, and an annual profit of £1,575.[114] Indeed, there are strong indications that these methods of calculation that had been originally devised on Tyneside in the seventeenth and eighteenth centuries, were still being practised in the nationalisation era following the Second World War. They certainly featured in government statistics showing the unit cost, unit selling price and unit profit for the industry as a whole, and in the pro-forma costing forms used by individual collieries in the 1940s and 1950s.[115] The main difference seems to have been that these forms quantified the past performance of operations, whereas unit cost data was used in the eighteenth century to forecast future profitability. Clement's statement that it was the National Coal Board that had first seen the need for forecasting the results of collieries, confirms that the earlier practice had previously been discarded.[116]

A contemporary published textbook on coal-mining, *The Compleat Collier* (1708), written by the anonymous author 'JC' (Archer [117] revealed his identity as J.C. Loudon) for estate owners in the north-east, while containing no calculations, confirms the importance of the viewers in compiling costing reports. *The Compleat Collier* is a guide to the various techniques involved in coal-mining, such as boring,

sinking and drawing water. Its orientation is technical rather than financial, therefore, but it does contain evidence of the way in which the viewers' practical experience underlay the calculation of unit cost. The author, for instance, speaking in the first-person of a fictitious viewer, records that drawing 420 corves (baskets) a day from a pit sixty fathoms deep is 'as much as most collieries of that depth, can, or do constantly work'. This will require at least eight horses 'which is, as always customary', to work four shifts at two at a time. The horses 'in these parts' will cost six or seven pounds each; and the viewer recommends purchasing ten to prevent production being halted by animals going lame. In relation to the hewing of coal, one miner would require a working seven yards wide 'in these parts'. This would allow three yards of coal for working, and four yards to act as roof support. 150 yards of coal would therefore support twenty miners. One barrow-man would be able to propel seventy corves a day. Having worked 200 yards 'to the east, west, north and south of the pit shaft, then it is time to have another shaft at that distance sunk for another new pit'. One viewer earning fifteen to twenty shillings a week would 'serve three or four working pits'. Each pit would be serviced by an overman, earning about eight shillings a week, who was responsible to the viewer.[118] Such information established the relationship between the cost of the inputs and the physical quantities of output, and lent itself to the calculation of unit cost.

Given the widespread existence of viewers' estimations of output, costs and profit, it is perhaps surprising that the underlying techniques were not set down in written form, whether published or not, for general dissemination. This is in marked contrast to the 'numerous eighteenth and early nineteenth century textbooks [which] dealt almost exclusively with merchant accounting techniques',[119] or indeed the published guides for estate stewards. Works relating to coal-mining in the eighteenth century do exist, but these generally dealt either with technical matters, such as JC Loudon's *The Compleat Collier*, or were arithmetically based ready reckoners, compiled by the viewers themselves, to help them carry out their calculations. John

Curr's *The Coal Viewer and Engine Builder's Practical Companion* (1797) combined both aspects. The work contains a number of costings, including tables for estimating the cost of sinking an engine shaft, where the cost was shown to vary in proportion to the depth of the shaft and the width of the cylinder.[120] The explanation for the lack of a costing literature may be that the viewers came from a distinct engineering tradition, which was still in its infancy compared to mercantilism or estate management. It may also reflect the fact that, while cost estimation in relation to physical measures of output was an integral part of viewing, it nevertheless comprised a relatively small part of the viewers' total work. Most of the viewers' records examined by the thesis dealt with the technical problems of mining, rather than the financial. This is illustrated by a viewer's leather bound notebook, dated 1774-95, contained within the Mining Institute Collection.[121] The book commences with a series of hand-written rules of mathematical calculation to assist the viewer in estimating weights, measures and capacity. A full list of the contents is included in Appendix 4. For instance, page 15 of the book details 'the rule to find how many tens of coals there is contained in an acre of ground'. The viewer is instructed to:

> multiply the square yards in one acre (which is 4,840) by the height of coal, and that by 8, being the bolls contained in a solid yard, and that divided by 418 gives the content in tens.

Pages 12 to 14 contain tables for converting the thickness of coal into measures of volume and weight. Although this type of information underlay the viewers' costings, it is listed alongside other instructions for estimating the capacity of pumping machinery.

A factor which emerges from the viewers' records is that, like the stewards, they worked in association with each other, and learnt their trade as apprentices with established viewers. In this way the succession of knowledge based on practical experience was assured, perhaps reducing the need for textbooks. John Watson (snr.),

for example, served his apprenticeship with his cousin William Newton of Burnopfield, 'who was one of the most eminent viewers of the day'.[122] Nicholas Walton became first acquainted with Heaton colliery in 1725 when he served as an assistant to his predecessor John Bullock. John Bullock was in the service of Sir Henry Liddell, and regularly undertook work on behalf of the Grand Allies.[123] Edward Smith (jnr.) succeeded his father Edward Smith (snr.), and in turn had five sons who were also brought up as colliery viewers.[124]

Finally, the business association between George Bowes and other estate owners and their agents through the Grand Allies raises the question of whether their meetings were a medium for disseminating accounting techniques. It was, after all, not just George Bowes who attended partnership meetings, but his stewards, Anthony and William Leaton, also. The planning data presented to partnership meetings is discussed in detail in Chapter 5. It was typical of the work of contemporary viewers and reflected a body of practice that was by then already widespread in the north-east of England. Consequently, one cannot be sure whether George Bowes' association with the Grand Allies resulted in the dissemination of accounting techniques to his estates, even where there are similarities in the records. However, the estate records do contain two computations of George Bowes' total coal profits for 1735 and 1736 which are so similar both in type and date to a report in 1734 for Henry Liddell, the Grand Allies' senior partner, as to suggest that accounting techniques may have been transferred between the partners. The 1736 computation for George Bowes is included below in Figure 8, and the one for Henry Liddell in Figure 49. The Regulation had collapsed in 1735, and there was uncertainty about its future.[125] It is therefore probable that these reports were connected to the decision about whether to support it. This is borne out by Figure 8, which quantified George Bowes' profits for the year, and then went on to say that they would have been £1,100 higher without the premium that applied in a non-regulated market.

Figure 8 Profits in the coal trade for the year 1736 [126]

Profit by Hutton ship coals. 376 tens .... produces neat profit £6. 8 --- per ten is	£2,392. 18 ---	
Profit by Hutton glass house coals. 270 tens .... produces neat profit of £5. 3 --- per ten is	643.15 ---	
Profit by Hutton pan coals. 270 tens .... produces neat profit of £2 per ten is	540 -- --	
Profit by Hutton fire [land-sale] coals. 60 tens at £1. 16 --- per ten	108 -- --	
Profit by difference in price of coals sold the beginning of the year	36 -- --	
Total Hutton [Gibside] profits		£3,720 -- --
[Partnership collieries:]		
By doing strict calculation making 1,800 [tens] per annum, allowances for dead rents of £1,000 per annum of which will be repaid again of partners' collieries, will clear £4 per ten of coals sold for £10. 8. 9 3/4 .... The vend this year 1,717 tens at £4 neat is		6,868 -- --
Total profits this year in the coal trade		£10, 588 -- --
By saving of the premium [to the London coal dealers] that which was expected to have been paid		1,100 -- --
Total profit		£11,688 -- --

Notes

1 Beckett, 1983; 1986: 149-156

2 ibid: 149

3 ibid: 150

4 Wills, 1995: 6

5 Bennett et al, 1990: 133, 158

6 Wills, 1995: 7-9

7 DRO: D/ST/B1/2/28, 99, 101, 116, 146, 170

8 DRO: D/ST/C2/3/21/7

9 DRO: D/ST/C13/34

10 DRO: D/ST/C13/36

11 DRO: D/ST/C13/39/3

12 DRO: D/ST/C1/3/58

13 DRO: D/ST/E5/14/41/2

14 DRO: D/ST/C1/3/60

15 DRO: D/ST/C1/3/49

16 DRO: D/ST/C1/3/52

17 DRO: D/ST/C1/3/59

18 DRO: D/ST/C1/3/54

19 DRO: D/ST/C2/1/5/4

20 Beckett, 1983: 95

21 Beckett, 1981: 27

22 Wills, 1995: 8

23 DRO: D/ST/C1/3/62/7-8

24 DRO: D/ST/C1/3/39/2

25 Wills: 1995: 9

26 DRO: D/ST/B1/2/2

27 DRO: D/ST/B1/2/170/2-6

28 NRO: ZR1/35/12, ZR1/39/12

29 Oldroyd, 1998

30 NRO: ZR1 47/1/1

31 Mingay, 1967: 18

32 ibid: 19

33 DRO: D/ST/C2/3/31

34 DRO: D/ST/C2/3/38/1

35 DRO: D/ST/C2/3/38/2

36 DRO: D/ST/C2/3/41-2

37 DRO: D/ST/B3/6

38 DRO: D/ST/B3/24

39 DRO: D/ST/C2/3/43, D/ST/B3/27

40 DRO: D/ST/C2/3/75 & 77

41 DRO: D/ST/B3/8/7

42 DRO: D/ST/C2/3/47-64

43 DRO: D/ST/C2/3/38/2-3

44 DRO: D/ST/E5/5/26

45 DRO: D/ST/B1/6/28

46 DRO: D/ST/C2/3/20/14

47 DRO: D/ST/E5/10/3, D/ST/E5/14/6

48 DRO: D/ST/E5/14/6-10

49 DRO: D/ST/E5/18/3

50 DRO: D/ST/E5/18/6

51 Wordie, 1982: 107-8; Beckett, 1986: 134-9

52 Wordie, 1982: 111

53 DRO: D/ST/C2/3/39/8

54 DRO: D/ST/B1/2/178/1

55 NRO: ZR1/35/13

56 DRO: D/ST/E5/1/1 & E5/5/28

57 DRO: D/ST/E1/6/1

58 DRO: D/ST/B1/2/164

59 DRO: D/ST/B1/2/172

60 DRO: D/ST/E5/5/29

61 DRO: D/ST/B3/3 & 14

62 DRO: D/ST/B1/2/23

63 DRO: D/ST/B2/103/5

64 DRO: D/ST/B2/125/1

65 DRO: D/ST/B1/126

66 DRO: D/ST/B1/20/168/2

67 DRO: D/ST/B1/20/168/3

68 DRO: D/ST/E5/14/39

69 DRO: D/ST/E5/14/40

70 DRO: D/ST/E5/14/41

71 DRO: D/ST/E5/14/11

72 DRO: D/ST/E5/17/61

73 Winjum, 1972: 23; Chatfield, 1977: chapter 8; Mommsen, 1980

74 Hatcher, 1993: 306

75 DRO: D/ST/B1/2/1

76 Hatcher, 1993: 253

77 ibid: 294-5

78 DRO: D/ST/B1/2/2

79 Pollard, 1965: 232; Edwards, 1989: 83

80 Flinn and Stoker, 1984: 177

81 Ellis, 1976: 43

82 DRO: D/ST/B1/22/2, 9, 15

83 Edwards, 1989: 58

84 Yamey, 1970

85 DRO: D/ST/E5/5/23

86 DRO: D/ST/E1/6/1

87 DRO: D/ST/B3/8

88 NUL: MSS/MISC/85/101-2

89 Parker, 1997

90 DRO: D/ST/B2/159

91 Parker, 1991

92 Edwards, 1989: 56-8

93 DRO: D/ST/B2/105

94 DRO: D/ST/B3/11

95 DRO: D/ST/B3/14

96 DRO: D/ST/E5/1-13

97 NRO: ZR1/37/1.2, ZR1/37/3/5 & 8

98 DRO: D/ST/B1/6/233/4

99 NR0: ZR1/35/13

100 Flinn & Stoker, 1984: 64; Harris, 1976: 170

101 Hatcher, 1993: 265

102 DRO: D/ST/B1/2/174

103 NRO: ZR1/35/22/75

104 NRO: ZR1/35/22/148

105 Levine & Wrightson, 1991: 66

106 DRO: D/ST/B1/6/180

107 Beastall, 1975: 25, 30; Medlicott, 1981: 183-8

108 NRO: 3410, F 1/4: 1, 15, 17-18 & 32

109 NRO: 3410, PECK 1: 7 & 55; FOR 1/5: 27

110 NRO: 3410, WAT 3/54: 15

111 Robertson, 1970: 9, 27-9 & 45

112 Hatcher, 1993: 265

113 NRO: 3410, BUD 14: 70

114 DRO: D/ST/B1/2/143

115 Bulman & Redmayne, 1951: xxiii-xxiv, 116, 121; Clement, 1951: 38-41

116 Clement, 1951: 42

117 Archer, 1897: 169

118 JC, 1708: 32-3, & 42-4

119 Fleischman and Parker, 1990

120 Curr, 1797: 94-5

121 NRO: 3410, WAT 4/14

122 NRO: 3410, WAT 2/4

123 NRO: 3410, WAT 3/43: 2/3

124 Hiskey, 1979: 12

125 Cromar, 1978: 203

126 DRO: D/ST/B1/6/96-97

4

FUNCTION OF ACCOUNTS WITHIN THE ORGANISATION (I)

Safeguarding the interests of the proprietor

Most of the Bowes accounts are of a financial accounting type, because they were designed to keep track of rights and obligations. For instance, accounts were necessary to ensure that the proprietor was not being cheated about the amount of coal produced or the expenses attaching to it. Such concerns are reflected in a letter by Charles Montagu to his cousin George Baker, who acted as his representative in County Durham. Montagu leased the Gibside mines from the estate between 1692 and 1723. He himself lived in London, and was obliged to rely on the expertise of two experienced hostmen, Thomas Fenwick and Thomas Rawlins, in mine management and the coal trade, although he trusted neither party.[1] He suspected Thomas Fenwick of pocketing up to £200 of his money each year, and in May 1696 he wrote to his cousin complaining about Thomas Rawlins, whose character it was to 'lay his hands on all he can, and draw the word of the law to defend it'. The letter continued:

> I say this that you may be aware of everyone and their information: for in colliery you will find more lying and tricking, than in any dealings you have ever had yet: Though at the same time I hope by this first trial you will find it neither requires very much time to attend, nor any great difficulty in it when attended. Except keeping accounts (which are also very short and easy) but I must beg we may use (though at expense) A Good Accountant [The underlining is in the text of the letter].[2]

The letter demonstrates that Montagu was impressed with the need for good accounting information to safeguard his interests against the possible dishonesty of his partners. Montagu's correspondence contains frequent references to accounts passing

between himself and his representative, George Baker, including *ex ante* projections for Gibside colliery. An example of the latter is a budget for the period May to November 1696, which forecast the mine's cash requirements for the summer's workings (q.v. p. 141). The co-existence of forecast and historical data made comparison between the two possible, and would have assisted Montagu in verifying the honesty of his managers at a distance, in much the same way as medieval estate stewards were required to justify their accounts in relation to what had been anticipated.[3] The submission of stewardship accounts through the post had a long history in commerce. It was, for example, an important feature of the business arrangements of English Tudor merchants, who operated over large distances and were obliged to delegate authority to their factors.[4]

Organisational link

The need to enforce rights and obligations meant there was a close linkage between the form of the accounts and the mode of organisational control. This is most clearly illustrated in relation to the Bowes' coal interests, where different methods of organisation were employed at different times, and the accounts responded accordingly. There are examples where the mines were leased, subcontracted, mined directly by the estates, or mined in partnership.

Leasing: As previously noted, the 1692 lease of the Gibside mines to Charles Montagu specified that he was obliged to pay the estate a fixed annual sum in addition to a proportional rent, dependant on the quantity of coal led from the mine.[5] From the estate's point of view, accounts were required that kept a tally of the quantities of coal led each year and the amounts of rent received. This information was supplied in the form of annual summaries of coals led and rent received during the 31 years of the lease, derived from weekly summaries for the individual pits.[6] From 1700, an annual rent account showed the quarterly figures of rent due and how much had been

received. Just as the lessee, Charles Montagu, needed accounts to protect his interests, so too did the estate.

Subcontracting: The accounting arrangements became more complex after 1723, when the lease was replaced with subcontracting agreements. It is unclear why George Bowes chose to subcontract the mines at Gibside rather than to lease them again, although the damage caused to the workings by Montagu is the most likely explanation. One of the main dangers of using lessees, was that they would wreck the workings to get more coal. This was true of Montagu, who maximised output 'at the cost of leaving a depleted inheritance to the owner'.[7] A viewer's report in 1717 found that the walls and pillars that supported the roof had been extensively robbed. In one part of the mine, they found an area of 150 yards by 70 yards supported only by wooden props.[8] Subcontracting gave the estate some protection against this type of destruction, as the subcontractors' agreements obliged them to work under the direct supervision of the estate's viewers. It also gave the estate more control over the mine's profitability, than leasing. In the first place, the workings were controlled by the estate's viewers. Second, the estate, rather than the subcontractor, retained ownership of the coals produced, allowing the proprietor to exploit market opportunities, such as the Regulation.

Subcontracting to specialists, like leasing, was fairly common in the early days of the coal industry.[9] A tentale men's account book, which recorded payments to subcontractors, confirms that the Grand Allies too used subcontractors at some of the partnership mines.[10] At a partnership meeting on 19 November 1726 it was agreed to pay Thomas Smith and William Hutchinson 32s a ten for coal produced at North Cawsey and Dawsons colliery.[11] A year later the consideration was increased to £1/13/6, which figure was incorporated into an estimation of the unit profit of Cawsey colliery in 1734 (q.v. p. 152). If a subcontractor failed to perform satisfactorily, the agreement could be terminated. A partnership minute of 5 March 1740 records that

the agreement with the subcontractors at Dawsons colliery was terminated 'following frequent complaints'. It was agreed to appoint Mr Stokoe instead, for a consideration of 31s/6d per ten.[12]

A subcontracting agreement, dated 8 December 1725, exists between George Bowes and John Dunn and Brian Davison in respect of two of the North Banks pits at Gibside. The salient features were as follows: George Bowes agreed to pay them 35s per ten of coal led. He would employ the miners. Dunn and Davison were to work under the direction of William Leaton, George Bowes' chief steward and resident viewer. Dunn and Davison would use George Bowes' horses for drawing the coals, for which they were obliged to pay William Leaton. Every fortnight they were to present daily reckonings of coals worked and coals led. They were required to discharge all the expenses of working and drawing the coals to the surface. Finally, the agreement contained an inventory of tools, props and equipment at the two pits.[13] The accounting records indicate that there were other subcontractors at Gibside, such as William Barras and Partners, who were presumably controlled by similar agreements.

Various examples exist of the types of reckonings mentioned in the agreement with Dunn and Davison. Daily sheets were compiled for the periods September to November 1723 and March to July 1724, and summarised weekly.[14] These sheets listed the information by pit. The quality of the workings was described as either 'good' or 'indifferent,' indicating inspection by viewers; and the names of the 'overmen' (subcontractors) were noted for each of the various pits. The situation of overman later evolved from that of subcontractor to salaried employee reporting to the viewer.[15] Fortnightly presentments of coals worked by the subcontractors have survived for the period 1726 to 1743. Here the fortnightly totals were converted into £s, signed by the subcontractor, and countersigned by the estate agent.[16] Annual

summaries were prepared from these reports.[17] There are many similar schedules for the Grand Allies' subcontractors.[18]

The physical verification of coal stocks played a major part; and coal seems to have been measured twice, once when it came out of the ground, and again when it was led away from the mine. The subcontractors were paid on the basis of the coal led, and it was important to ensure that none went missing beforehand. Consequently, the quantity of coal led was reconciled to that of coal worked, taking into account the closing stocks resting at the pit. A schedule for the period 1723 to 1726 listed the fortnightly quantities of coal worked for each pit, which were totalled annually. For each pit, the quantity of coals worked was reconciled to that of coals led for the four year period, with comments on the surplus or shortfall. An extract from the report on Nixon's pit is included in Figure 9. The account showed a shortfall of forty-four tens

Figure 9 Reconciliation of coals wrought to coals led [19]

Nixons Pitt

	xx	cl	xx	T	xx	cl	
1723 wrought	722	9	at 12 per ten	60	2	9	
1724	1,082	6		90	2	6	
1726	660	16		55	-	16	
			2,465 11				205 5 11
	wag[ons]						
1723 led	569		at 22 per ten	25	11	-	
1724	1,746			79	4	-	
1726	1,236			56	2	-	
			3,550				161 5 -
				Remains			44 - 11

But by computation there is but about 33 tens at the workings [presumably closing stock] fall short of answering the leadings 11 tens ....

of coal, thirty-three of which were explained by the stock remaining at the pit, leaving eleven unaccounted for. A similar report dated 31 December 1739, listing the 'overs'

and 'shorts,' contains auditors' ticks.[20] The overs and shorts were usually priced. In the case of the 1727 to 1735 presentments of William Barras and Partners, the total shortfall for the nine year period amounted to £333, after taking into account the stock of coal at the pits.[21]

Similar stock reconciliations were prepared in respect of the Grand Allies' subcontractors. A schedule has survived listing the quantity of coal wrought at each of the eight pits at Cawsey colliery during the previous thirteen years, and reconciling it to the coal led by the three partners. Figure 10 gives the final part of the reconciliation, showing a shortfall of seventy-six tens and twelve wagons.

Figure 10 Presentments for Cawsey [22]

		tts	w
[Coal wrought from detailed analysis]		4,666	---
	w		
Led by GB	1,014.18		
HL	1,721.12		
EW	1,854. 1		
		4,589.10	
			76.12 short

Each of the Bowes subcontractors had a control account that was charged with such deficits. In the case of Dunn and Davison, their account was debited with an amount of £82/19/1 in 1735, resulting in a balance payable by them. (Figure 11). They each signed the document to attest that it was 'right'. Dunn was charged personally with a further shortfall at the Barn pit of £52/12/7, although this was cleared by an extra allowance of coals for his own use (Figure 12). In this instance, the account was signed by Dunn together with Richard Stephenson, George Bowes' agent. A schedule that was produced in 1741 provided final proof of the particulars.

Figure 11 John Dunn and Brian Davison's account with George Bowes 1726 to 1735 [23]

	Dr		Cr
Charges for pit horses, pit props and cash advanced		Owing to partners for coals delivered	
			141.13.10
		31.12.1729 Balance due to G. Bowes	5. 1. 9
	146.15.7		146.15.7
31.12.1735 Balance on old A/C	5.1. 9	By working at Spring pitt	20-----
To 46 tens, 2 wagons short at Barn pitt at £1.16s per ten	82.19.1	Fire coals allowed them	48-----
		Balance due from Dunn	10 -- 5
		Davison	10 -- 5
	88 -- 10		88 -- 10

Figure 12 John Dunn to George Bowes [24]

	Dr		Cr
To his share of balance in partnership	10 -- 5	By cash short paid for working coals at the Barn pitt	2. 10. 9
To an overcharge of working at the Barn	12. 10 --	By several articles of particulars	18. 14 --
To coals wrought short at the Barn	52. 12. 7	By fire coals allowed to balance ye A/Cs	53. 18. 3
	75. 3 --		75. 3 --

This reconciled the final agreed shortfalls to a list of the workings and leadings over the previous seven years (Figure 13).

Figure 13 Dunn and Davison A/Cs of workings and leadings settled and agreed 6th November 1741 [25]

	Dr		Cr
Coals wrought [listed ...]		Coals led [listed ...]	
			1,024. 8. 6
		Short at Barn pitt	52. 12. 7
		-do-	82. 19. 1
	£1,160 -- 2		£1,160 -- 2

Allied to the subcontracting of the Gibside mines was the need to provide the subcontractors with equipment, and there are a number of associated accounts. Agreements were made in June 1741 and July 1744 with Thomas Young to supply 'iron gear', such as shovels and underground sledges.[26] The consideration was linked to the quantity of coal worked. In June 1741 he agreed to keep the mines supplied with iron-gear in return for a payment of 9d for every 200 corves (baskets) of coal produced. In July 1744 the price was raised to 10d. Inventories of the tools and equipment he was responsible for maintaining or replacing were taken by location in May 1741 and July 1744.[27] Many similar inventories have survived, such as one for North Banks colliery at 31st December 1754, which priced the various items.[28] Ultimately, the subcontractors bore the cost of any equipment provided. In February 1725, for example, the deals, trams and ropes in Nixon Pit were counted and priced for recharge to the subcontractor, W. Naisby.[29]

Direct mining: Direct mining seems to have been uncommon, but did take place at Cow Close, in the south of County Durham, near Streatlam. Here a manager, Kay Coats, was directly responsible to George Bowes. The absence of the intermediary subcontractor simplified the accounting problem. Charge and discharge accounts sufficed, such as the ones prepared by Kay Coats during the period 1742 to 1746. The 1742 account is shown in Figure 14. These charge and discharge statements recorded

Figure 14 Kay Coats for Cow Close colliery [30]

1742					
Dec 31	Received for ready money coals sold this year as per weekly bills	179.6.10	Weekly pay bills Wayleave rent Wayleave carriage Damage to pasture Own salary [amounts listed, totalling]		160.15.9
	To account of Trust money for the whole of that charge sold on credit this year as per account of particulars	29.8. 6	Arrears of trust money Balance		17. 13.1 30. 6. 6

the colliery expenses and coal sales, taking into account the arrears owing for coal sold on 'trust' (credit). They were prepared from sales ledgers and bound weekly cash books on a calendar year basis.[31] Additionally, an abstract of weekly receipts and payments has survived for the period 1742 to 1749 that agrees with Kay Coat's charge and discharge accounts.[32] This was prepared after the event as it mistakenly placed 1747 before 1746. It listed the quantities of coals worked as well as the values.

Partnerships: George Bowes was involved in various colliery partnerships, and accounts ensured he received his dues in line with the partnership agreements. This was the case at Northwood and Cragwood colliery, near Streatlam, which from 1752 he worked in partnership with Edward Gilbert, who was also his father-in-law. Site preparation commenced in June 1752, and hewing in January 1753. The colliery was

managed by John Sedgwick together with farms at Toft Hill and Ramshaw, and he accounted for both farms and colliery together. Sedgwick received cash advances from Thomas Colpitts, George Bowes' agent at Streatlam. He was responsible for meeting colliery expenses and the land-sale of fire coals. The two partners bore an equal share of the colliery's expenses and output; retrospective statements existed to prove this, such as the one in Figure 15, which recharged Edward Gilbert with his share of the colliery's expenses. The expenses were listed and totalled, and divided by

Figure 15 Abstract of Northwood colliery in partnership between 1752 and 1757 [33]

[Annual payments in year listed:]		Received from J. Sedgwick	
1752	152.2.4	1753 & 1757	200-----
1753			
1754		Dec 31 Balance in	
1755		disburse by G. Bowes	1,079.15.11
1756		E. Gilbert	1,079.15.10
1757			
	2,359.11.9		2,359.11.9

NB Mr Gilbert has paid ye
balance of 1,079.15.10

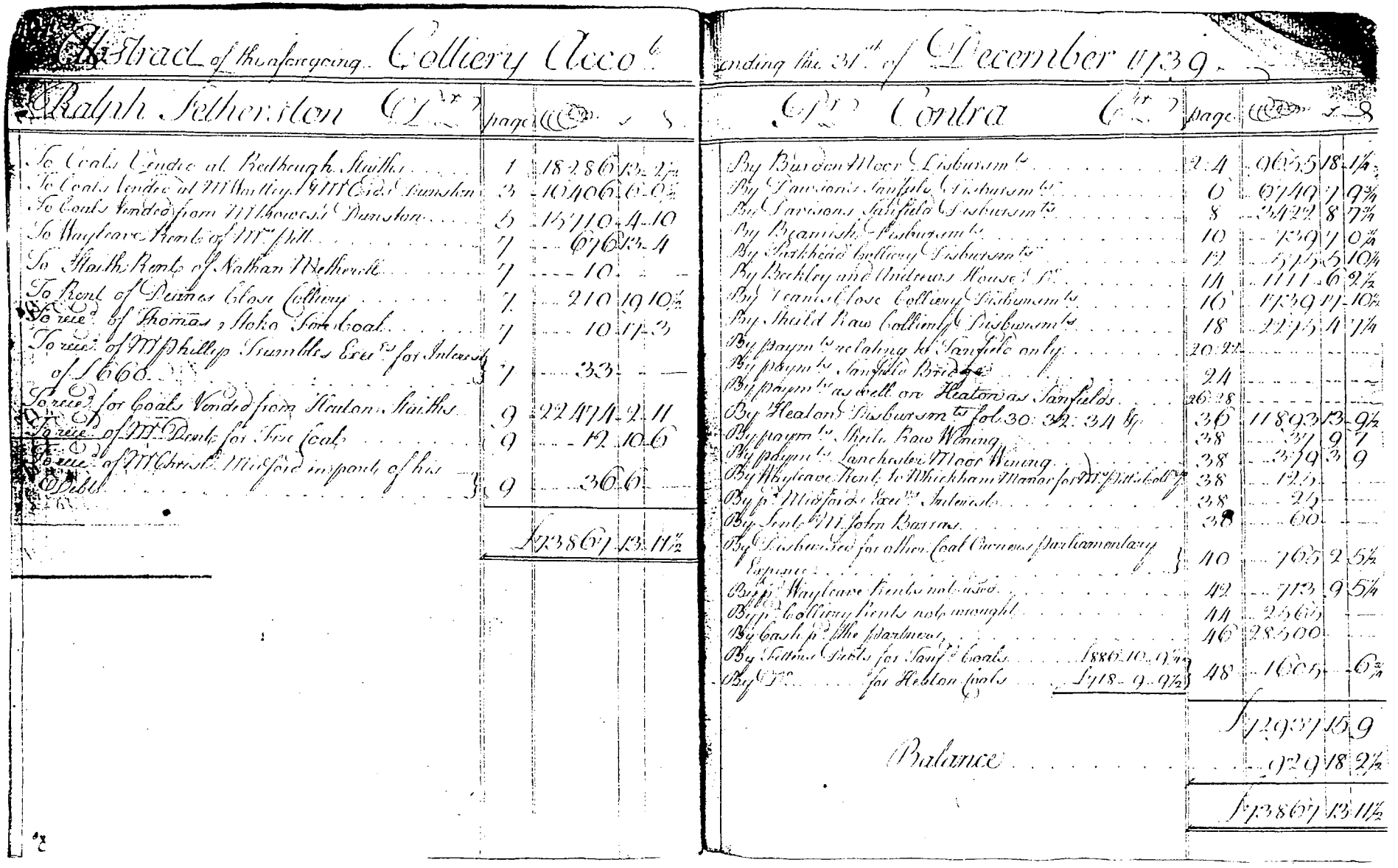
two. Other similar schedules exist, listing the Northwood colliery expenses and revenues in half shares over various periods of time.[34]

Although collieries were worked in partnership, the output was divided between the partners, and sold by them individually. Hence, the production and sale of coal were treated as separate functions, and it was common accounting practice to apportion expenses and output separately between the partners, rather than to apportion a figure of profit. Treating production and selling as separate functions may have been encouraged by the common use of subcontractors at this time for coal-production. Output was determined by physical stock checks. In the partnership

between George Bowes and Lady Clavering at Bucksnook and Bucksfield collieries, these inventories also determined the apportionment of expenses, which was done in direct proportion to the number of tens led by each partner.[35]

The accounts of the Grand Allies, George Bowes' most important partnership, followed the same pattern. The partnership was formally constituted by a ninety-nine year agreement which provided for the mutual working of collieries and the granting of wayleaves.[36] It was signed on 27 June 1726 and commenced on the 11 November 1726. Its principal features included: (i) with the exception of the partners' estate collieries, such as Gibside, all of their colliery interests were to be divided into three equal parts; (ii) the partnership collieries were to be worked jointly at a joint charge, although the coal was to be led to separate staiths and sold by the individual partners separately; (iii) the capital costs of building bridges, making wagonways, acquiring or winning collieries, in addition to any costs of litigation were to be borne equally between the three partners; (iv) the agreement specified the partners' shares of total annual output; (v) they each had the right to inspect the others' books weekly; (vi) the year end was fixed on the Wednesday following Christmas day, thereby establishing the period of account for financial accounting purposes.

From an accounting perspective, the agreement is mainly significant because it established the need for accounts to achieve parity between the partners in relation to costs and output. The agreement also determined some of the detailed financial accounting arrangements, such as the year end and the right of the partners to inspect each other's books. A schedule has survived that listed the partnership's expenses for 1726 and divided them by three, to produce a total due by George Bowes of £2,454.19.5, half of which he owed to Henry Liddell and half to Edward Wortley.[37] Similarly, the coal led by each of the three partners in 1727 and 1728 from Burdon Moor, Cawsey, Tanfield, Beckley and Bucksnook collieries was listed and compared to one third of the total leadings, to give a surplus or shortfall for each partner. [38] In



Abstract of the aforegoing Colliery Acco.ts ending the 31st of December 1739

Ralph Jefferson Cr.	page	£	s	d
To Coals Vended at Redheugh Staithes	1	1828	6	2¼
To Coals Vended at Whitley 1911 Chal.s Dunston	3	1040	6	0½
To Coals Vended from Whitton's Dunston	5	151	10	4 10
To Wayleave Rents of Mr. Hall	7	6	16	4
To Staith Rents of Nathan Wetherell	7	10		
To Rent of Pennes Close Colliery	7	210	19	10½
To rece.d of Thomas Stoko for Coal	7	10	17	3
To rece.d of Mr. Phillips Trumbles Exec.rs for Interest of £660	7	33		
To rece.d for Coals Vended from Heaton Staiths	9	2241	2	11
To rece.d of Mr. Rents for Fire Coal	9	12	10	6
To rece.d of Mr. Christ.r Mitford in part of his Bill	9	366		
		£7386	13	11½

Cr.d Contra Cr.	page	£	s	d
By Burden Moor Disbursem.ts	2 4	0655	18	1¼
By Dawsons Sandsfield Disbursem.ts	6	0740	7	9¾
By Dawsons Sandsfield Disbursem.ts	8	3422	8	7¾
By Beamish Disbursem.ts	10	0397	1	0¾
By Parkhead Colliery Disbursem.ts	12	0515	5	10¼
By Beckley and Andrews House Disb.s	14	1111	6	2½
By Pennes Close Colliery Disbursem.ts	16	1239	11	10½
By Shield Row Colliery Disbursem.ts	18	2215	4	1¼
By Paym.ts for Coking at Sandsfield only	20 22			
By Paym.ts Sandsfield Brid.ge	24			
By Paym.ts as well on Heaton as Sandsfields	26 28			
By Heaton Disbursem.ts fol. 30. 32. 34 &c.	36	11893	13	9½
By Paym.ts Shield Row Wenning	38	37	9	7
By Paym.ts Lanchester Moor Wenning	38	359	3	9
By Wayleave Rent.s to Whickham Manor for Mr. Pitt's Coll.y	38	125		
By p.d Mitford Exec.rs Interest	38	23		
By Rent to Mr. John Barras	38	60		
By Disbursed for other Coal Owners Parliamentary Expence	40	765	2	5½
By Wayleave Rents not used	42	713	9	5¼
By Colliery Rents not wrought	44	2560		
By Cash p.d the Partners	46	28500		
By Fitters Bills for Sand.d Coals 1886 10 9¾	48	1005		6¾
By D.o for Heaton Coals £118 9 9½				
		£14937	15	9
Balance		0929	18	2½
		£7386	13	11½

99

Figure 16 Abstract of the aforegoing colliery accounts ending 31st December 1739 39

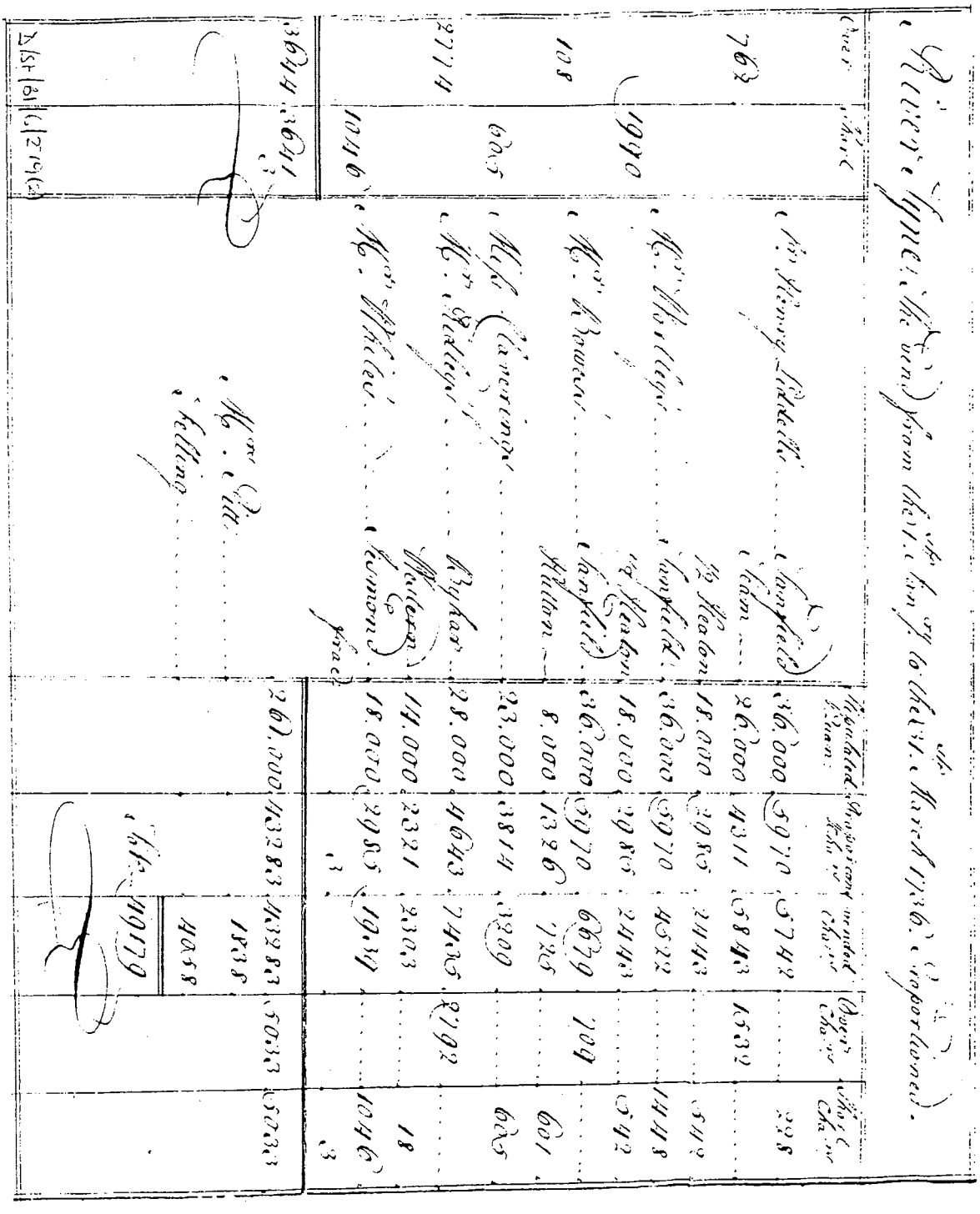
1737 Albany Baker, the wagonway contractor, prepared an estimate of the cost of laying a new stretch of wagonway at Shield Row, which divided the total of £221/8s between the three partners.[40] George Bowes' equalised share of the partnership's costs for the ten months to 31 December 1738 amounted to £3,496, compared to his £16,553 share of the revenues.[41]

Ralph Fetherston maintained detailed cash books and summaries for the partnership, which underlay these apportionments of costs and revenues. Fetherston acted as agent for Edward Wortley between 1728 and 1761, and he also seems to have been responsible for handling the Grand Allies' business arrangements. Figure 16 is a copy of his summary cash account for 1739. Similar abstracts were prepared for 1740, 1741 and 1742.[42] Receipts were recorded on the left, and payments on the right. The various entries in Figure 16 were cross-referenced to the cash books, which itemised the sales by quantity as well as value.[43]

The Regulation was another loose kind of partnership in which the various coal owners agreed to limit output in order to maintain price. Each coal owner's share of projected total sales for the year was fixed in advance. Accounts were needed to monitor compliance, such as the schedule in Figure 17 relating to the period 1 January to 31 March 1736. George Bowes' sales for the year had been set at 44,000 chaldrons, which was approximately 17 percent of the total. This entitled him to make sales of 7,296 chaldrons during the first three months of the year, compared to his actual total of 7,404 chaldrons. Consequently, he had exceeded his entitlement by 108 chaldrons. An identical type of report has survived for the period 1 January to 14 April 1736, suggesting these reports were updated fortnightly. The same exercise was carried out in respect of the Grand Allies over a six year time series.[44]

The accounting records of George Bowes' activities in the salt trade indicate that a regulated vend may have applied here also. This would not be surprising, given

Figure 17 River Tyne. The vend from the 1st January to the 31st March 1736 proportioned [45]



that the same parties were involved, and Ellis referred to the existence of a combination of owners in 1702.[46] R. Morrison acted as agent on behalf of all the salt owners at North and South Shields in producing a range of statistics of salt deliveries, analysed by owner and port. In April 1747, for example, he produced 'An abstract of the vend of sale in North and South Shields Collections' that listed the tons of salt shipped by each of the owners during the previous three years. The totals on this list agreed to another one, analysing the shipments by port of destination. The latter covered a period of nineteen years (Figure 18). As well as quantifying and analysing

Figure 18 An abstract of all salt delivered in North & South Shields collections for 19 years [47]

Ports & c	1732 Tons	1733 .... Tons	1750 Tons	Total Tons	Medium Tons
Aldborough	--	1	9.25	74.3	3.37
Alnmouth	7	31	35	613.20	32.12
....					
	1898.11	7979.24	7280.15	160732.13	8459.24
Retail					
Fisheries					
Foreign trade					
Scotland					
Total	6875.20	12121.31	8381.20	202297.20	10647.00

[Signed R. Morrison 16 April 1751]

the salt sales, this document also calculated the yearly average for each of the categories (Medium tons). For instance, it showed total sales for the nineteen years at 202,297 tons, at an average of 10,647 tons per year. These summary schedules were prepared from detailed monthly accounts which showed the comparative figures for the same month in the previous year.[48] Morrison also prepared summaries of the

various owners' stocks of salt at 31 December. The owners were listed in order of their numbers of pans. Top of the list was Sir Henry Liddell, the Grand Allies' senior partner, with twenty-nine salt pans. George Bowes was fifth with eleven pans, closely followed by Matthew Ridley with ten.[49] If these records are not indicative of a regulated vend, it must have been the case that the owners worked in association with each other to share trade information on a regular basis.

Ridleys: The Ridley accounts too were versatile in dealing with different types of organisational control. Jesmond colliery, for example was mined in partnership using subcontractors, with a salaried manager - he seems to have been paid ten shillings a week - to co-ordinate and oversee the whole operation. Accounts controlled the various contractual obligations.[50] Weekly presentments of coals wrought exist for the subcontractors, annual charge and discharge accounts for the manager, Joshua Shields, and various weekly, monthly or annual statements for the partners, apportioning costs and output between them.

The Ridley family differed from the Bowes in their involvement in joint-stock companies. They were, for example, shareholders in the North and South Blyth companies, about which little is known.[51] An indenture dated 23 December 1763 gives something of the North Blyth company's history.[52] The company was formed in 1693, with the issue of a thousand shares, to acquire land in and around Bedlington and Blyth in Northumberland, in order to carry out collieries and salt works there. 'But the said undertaking proved unsuccessful and was discontinued, and the said estates were afterwards mortgaged for £3,000 and interest'. By 1730 unpaid interest of £2,083 had accumulated on the mortgage, which when added to the principal, made a total liability of £5,083. The shareholders at this time seem to have been Richard and Nicholas Ridley, Joseph Kapel and John Emmerton. Between them, they raised the necessary money to pay off the debt, and rescue the company from falling into the hands of the Liddell and Cotesworth families:

> The adverse party finding that they were not able to accomplish their designs which I conceive were to get possession of the North Blyth estate, and to keep it for themselves, but God be thanked their measures are now broken and the prey plucked out of their jaws.[53]

John Emmerton's was the largest contribution, as he paid the £3,000 principal plus £385 of the interest. He seems to have assigned his interest in the company to Nicholas Wescombe, who in 1782 demanded repayment of the £3,000, which claim was upheld in Chancery.[54] Most of the surviving accounts relate to the period after 1767, when Matthew Ridley and Nicholas Wescombe seem to have been the only shareholders, and the company's only source of income the receipt of rents. John Lawson managed the company's estates, and was paid a 'receiver's poundage' of one shilling for every pound of rent collected. He corresponded regularly with both parties, and produced various accounts, including a rent account in respect of each tenant, lists of arrears and annual charge and discharge statements.[55] Lawson seems to have paid the balance of the rents received after expenses to Matthew Ridley, who in turn paid Nicholas Wescombe a half share. Accounts were prepared to prove they had each received the correct amounts, such as two schedules which compared their receipts to their entitlement over an eight year period.[56]

The Ridleys' glass-houses on Tyneside shared many of the characteristics of joint-stock companies, although their precise legal status is unclear. Matthew Ridley bought the Howdon Pans glassworks from the Henzell family in 1759, and in 1765 Sir Matthew White Ridley, his son, acquired a controlling interest in the remainder of the Henzell glass-houses.[57] Accounts have survived from 1778, prepared by an agent on behalf of the proprietors, comprising annual accounts of stock, statements of the 'profit dividends' paid to the proprietors and audit reports.[58] The stock accounts summarised the stock of bottles, materials, debtors, creditors and cash at 30 December, and are akin to a balance sheet. In fact, the audit reports, which are

discussed below (q.v. p. 122), describe them as such. The stock accounts were supported by detailed lists of debtors and creditors that took into account a provision for 'doubtful' debts. The proprietor's share of profits was recorded on one side of the dividend statement, and the settlement on the other.

Legal underpinning

An important feature of the accounting procedures, therefore, is that they were flexible enough to respond to the different forms of organisational control that applied at different times. Another, is that the contractual obligations of third parties were underpinned by written agreements, such as the Grand Allies' partnership agreement, referred to above. The legal underpinning of the business arrangements, combined with the use of accounts to monitor compliance, was typical of all the Bowes estates' business activities. There are many examples:

Agreements for hiring gangs of labourers were controlled by weekly time-sheets. Figure 19 is an example.

Figure 19 For levelling of ground for new wagonways to North Banks colliery for George Bowes for week ended 22 August 1722 [59]

	M	T	W	T	F	Total		£ s d
Geo Forster	1	0	-	-	-	1	at 10d	0 0 10
Geo Storey	1/2	1	1	1	1	4 1/2	at 9d	3 4 1/2
Abraham Jack	1	1	1	1	1	5	at 10d	4 2
.....								
Costs of week								4 7 11 1/2

Fitters' contracts obliged them to provide George Bowes with regular accounts of coal sales and shipments. In 1725 John Robinson was required to do so weekly.[60] By the late seventeenth century the role of the fitter had changed from that of an

independent merchant, who purchased coal on his own account, to that of an intermediary engaged by the owner to sell coal on a commission basis.[61] The next stage in the chain was the ship's master. In theory, he acted independently to buy coal at Newcastle and sell it at London for a profit which he retained, although Flinn and Stoker believed he was merely another type of agent.[62] Figure 20 illustrates the annual accounts between George Bowes and the fitter Henry Atkinson for 1723. The series runs to 1735. The sale proceeds owing by the fitter are included on the left side, with the settlement paid to George Bowes' agent on the right.

Figure 20 Account of Henry Atkinson fitter with George Bowes 1723 [63]

31.3.1723		By cash in part	
1,151 chaldrons of neat Hutton coals delivered from 1 July last at 10s 8 1/2d	£616.5.3	[payments listed, totalling]	583----
		By short makings allowed this year	5.5---
		31.3.1723 Balance then due	28---3
			616.5.3

According to Hatcher, 'sea' chaldrons were different to 'led' chaldrons.[64] Royalties payable to landlords were based on the latter, whereas 'sea' or 'vending' chaldrons were used to calculate customs duty. Another complication was that coal shipped from the Tyne was measured in 'Newcastle' chaldrons, whereas its quantity when it was unloaded was reckoned in 'London' or 'Winchester' chaldrons.[65] The process of conversion between the various measures was known as 'making-out', and the allowance for short makings of £5/5s in Figure 20 represents a difference on conversion. A similar account for another fitter shows how 'short makings-out at London' of £4/5/8 were calculated (Figure 21). Newcastle and London chaldrons were

Figure 21 Messrs Crowe & Armorer to Geo Bowes Esq
1723 short making out this year [66]

	cha[ldrons]		cha v[ending]	ch v	
Hen Thirkelle took in	128	made out	239.2	short 8.2	
Wm Flower	96		177.2	8.2	
Wm Soans	132		252.2	3.2	
			In all	20.2	
Capt Stoke	81		161	4.2	
At 5.4 1/4 per chal				16	£4.5.8

measures of volume rather than weight. A discrepancy between the two could arise if the motion of the ship caused the same weight of coal to settle into a different volume,[67] and the allowance for short makings was probably a reflection of this.

Retrospective summaries were prepared to prove that a fitter had discharged his responsibilities to the proprietor over an extended period, such as a schedule for William Scott covering the period 1737 to 1769.[68] These accounts, which showed total coal deliveries amounting to £60,220, were signed by him on 31 December 1772 to signify they were 'settled and agreed'. The individual fitters' accounts were also transcribed into card bound sales ledgers.[69] The series runs continuously from 1725 to 1773. Eighteen fitters are listed for 1726. The sales ledger accounts were balanced annually on 31 December. Finally, accounts have survived detailing the individual cargoes of coal shipped - according to both Newcastle and London measures - by date, ship, master and fitter.[70]

The transportation of coal from the pit-head to the Tyne along wagonways was the most expensive element of the Bowes' coal mining operations. The cost of laying the track alone was quoted by a contractor at 5s a yard in 1722 (£440/mile), although it did vary, as another estimate in 1737 had it at 2s.[71] In addition to the costs of construction, regular repairs and maintenance were necessary as well as wayleave

Figure 22 Albany Baker wagonway maintenance account [72]

rents and wages for the wagonmen. The conditions for all of these contracts were agreed in advance and enforced through accounts. This was true of the wayleaves payable by George Bowes to his neighbour Ralph Harding in the 1720s for crossing his land, where accounts showed the rents due and moneys paid.[73] It was also true for the wagonway contractors, who agreed to maintain the track on a continuous basis in return for a proportional fee based on the number of tens of coal led over the track, to reflect wear and tear. In 1729 the rate seems to have varied between 6s and 9s a ten.[74] Figure 22 above is a typical repair and maintenance account of a wagonway contractor. The right hand side of the account calculated the tentale maintenance charge in respect of the North Banks and Grand Allies' leadings in 1733 and 1734, and included an extra allowance for materials and a new stretch of track. The left side recorded the settlement. The situation of the wagonmen, who led the coal, was similar. Written agreements bound them to particular owners, and accounts were used to record their *adlings* (wagon pay).[75] It was common practice on the Bowes estates to use tenants for this purpose, who received an *adling* allowance against their rent (Figure 23). In this particular instance, the tenants received a cash advance of

Figure 23 Adlings account [76]

1767				
Dec 31	Widow Cromwell & sons arrears then due		19.10 --	
1768				
Nov 22	To one year's rent		39 -- --	
	To a keel of limestones delivered in 1767		1.18 --	
Dec 31	To cash paid this year		36.15 --	
			97. 3 --	
By wagon adling first pay		47.17.0		
By do second pay		34.14.2	82.11.2	14.11.10

£36/15 on their wages. *Adlings* of £82 seem large - according to the contemporary J.C. Loudon, the typical retention fee for a viewer was £50 a year [77] - which suggests either that the family was very large, or that they themselves employed wagonmen or

subcontracted some of the work. A contract with an unspecified party in 1729, whereby they agreed to provide their own wagonmen, wagons and horses for transporting George Bowes' coal, suggests that professional firms of wagonmen did exist.[78] Wagonmen were held accountable for any estate wagons in their charge, which were numbered in inventories.[79] Conversely, they received an allowance at full market value for any of their own horses killed in the operation.[80]

Tenancy agreements stipulated annual rents,[81] and rent rolls and ledgers ensured they were paid. A complete set of rent ledgers has survived for the Gibside estate covering the period 1717 to 1784. Thereafter, the series recommences in 1805.[82] The same system was used on the Bowes estates at Streatlam and Wemmergill.[83] It was also employed by the Ridleys on their estates at Blagdon and Plessey, and on the estates of the North and South Blyth companies, in which the family had a major interest.[84] Usually the tenants were indexed in the front of the ledgers. George Black's account at Gibside (1735) is shown in Figure 24. The

Figure 24 Extract from Gibside rent ledger 1735-1742 [85]

44 Lamesley	Geo Black				
1734 Dec 31	To arrear then due from old rental	9.5	1735 Nov 11	By cash William Leaton received in full to May Day	18.10
1735 Nov 11	To one year rent due for his term at Lamesley	18.10	Dec 31	By arrear then due	9.5
		27.15			27.15

account shows that he was up to date with his current rent, but in dispute over an old balance. Figure 25 contains an extract from a typical bad debt listing. A further list

Figure 25 Extract from Gibside rental 31 August 1742 [86]

Edward Charlton	an old arrear	3 ---- 6	A letter sent to him
Ra. Surtees	due May Day	50 - 6 - 4	Third of his wages to be deducted
Widow Havelock	-do-	2 - 5 ---	To be compelled to pay this instantly
Peter Reedes	for fire coals	--- 11 ---	To be deducted weekly
Wm. Proctor	an old arrear	9 - 11 - 10	To be sued if not paid instantly

for 1748 was entitled 'tenants most hazardous in Gibside collection'.[87] The ultimate penalty for non-payment of rents was distraint of goods, and a number of schedules, sale bills, accounts and other papers have survived relating to dispossessed tenants at Gibside.[88]

Subcontracting to partnerships of miners was common practice in the lead industry, and the contracts were entered in bargain books. In 1762 John Bourn, a mine manager, wrote:

> I told them [the subcontractors] that I was advised for the safety of Mrs Bowes [George Bowes' widow] as well as my own satisfaction to keep a bargain book, and enter all agreements made betwixt party and party and signed by us both; and that the said book of agreements might be produced upon any emergency, before you [William Leaton] or Mrs Bowes to determine any dispute that might hereafter arise .... [89]

The most common type of bargain was the *bingtale,* whereby the mining partnership was paid according to the number of bings (standard unit of lead production) of ore produced.[90] Accounts, such as the one in Figure 26, ensured that payments were correct. Subcontractors could also be paid in relation to the distance they had driven through the ground measured in fathoms (*fathomtale*). Turnbull suggested that a division of labour existed between these partnerships, who undertook the 'dead work' such as driving levels and sinking shafts, and those working the ore, who were paid on a *bingtale* basis.[91] Again, accounts controlled the *fathomtale* contracts (Figure 27).

Figure 26 A bill of ore delivered from Isabell Meah Hills from 24 June 1741 to 11 November 1741 [92]

Oar book	Bargain book		bing	hors		
18	2	Thomas Kaisbeck & partners at the stapple shaft up field	7	2	at 10s	3 - 15 - 0 [ticked]
		....				
		B H				
		464.1				234 - 8 - 6
						all paid

Figure 27 A bill of fathom account at Isabell Meah Hill from 9 July 1741 to 11 November 1741 [93]

Bargain book		fathoms		
20	John Bell & partners for sinking a shaft	$5^1/_4$	at 8s	2 - 2 - 0 p[ai]d [ticked]
22	do for drifting	$5^1/_4$	at 10s	2 - 12 - 6 pd [ticked]
	....			
				45 - 14 - 9

In both situations, the accounts applied the agreed rates to the amount of work undertaken, and reconciled the moneys due to the settlement. The subcontractors were supported by a range of labourers such as joiners and blacksmiths who were paid on a daily basis. Accounts have survived that recorded these parties by name, the work performed, the number of days, the rate of pay and the final settlement.[94]

Leasing provided an alternative to subcontracting in the lead industry, whereby designated areas of land were leased to mining partnerships in return for a specified percentage of the ore produced, known as the 'duty'.[95] A typical agreement was entered into between the Bowes estates and John Alderson and Jonathon Horn in 1762

in respect of the Cocklake mine near Wemmergill. Alderson and Horn were permitted to work an area specified as '100 yards broad each way from the founder shaft and 800 yards in length' for a period of six years in return for one sixth of the washed ore produced. When the ore was ready for weighing, they were obliged to give John Bourn, the agent, a week's notice to allow him to attend the weighing, to ensure the duty was properly applied. The estates were to have first refusal on buying the rest of the ore at the market price. The lease would become forfeit if the mine were left unworked.[96]

There were many similar agreements, a sample of which is listed in Figure 28. The rate of duty in the sample fluctuated between one seventh and one fifth, but seems to have stabilised at a sixth. This spread was typical of other regions.[97] To a degree, rates varied in proportion to profitability, the most productive mines attracting the highest duty, although often they were inelastic.[98] This is borne out by the length of the Bowes leases; typically the rates were fixed for twenty-one years. Two other interesting factors emerge from Figure 28. First, it shows the persistence of leasing as a method of organisational control in lead mining, and that it was practised concurrently with subcontracting, which, as we have seen, took place at the same time. The criteria for selecting one method over the other is therefore unclear. Second, there was a blurring between the role of lessee and landlord's agent. On the one hand William Horn entered into a twenty-one year lease in 1741, whereas on the other he acted as George Bowes' agent in another lease in 1744. This shows that the Bowes' stewards were not necessarily full-time officials, and that they could engage in business on their own account. The thesis has already referred to William Leaton, George Bowes' chief steward, performing viewing commissions for the Ridleys (q.v. p. 75). Having a sideline was not unusual. The Duke of Norfolk's chief viewer had his own iron foundry which conveniently supplied the estate collieries with most of their iron.[99]

Figure 28 Lead leasing agreements [100]

Date	Lessor	Lessee	Location	Term	Duty
1709	Elizabeth Bowes	Charles Bainbridge	Lune, Holwick	21 years	1/7
1711	Elizabeth Bowes	Robert Allinson	Greenfell Common	1 year (with option for 21)	1/6
1741	George Bowes	William Horn & Edward Rain	North of Long Crag near Mickle Fell	21 years	1/5
1744	William Horn (on behalf of Geo. Bowes)	Robert Dent & John Bedell	Closehouse vein	10 years	1/6
1752	George Bowes	Charles Wensley	Lunedale at Rowton Syke	21 years	1/6
1755	George Bowes	William Dockray, Joseph Cradock, William Watson, John Cradock, Anthony Cradock	Green Mines, Quorgill & Langstaffs Hush in the manor of Lune	21 years	1/6

Accounts were necessary to ensure that the rates of duty were properly applied. For example, the rates for 1744 were recorded in a permanent form by listing them in the back of the ledger.[101] The rate for the Standards mine was noted at a seventh, which figure was incorporated into the pay-bill detailing the weight of the ore produced, priced at its market value (Figure 29). In this instance, George Bowes decided to exercise his option to buy the 20 $^{6}/_{14}$ bing of ore remaining after the deduction of his $^{1}/_{7}$ duty. Summary schedules, such as the one in Figure 30, itemised the duty ore produced in a particular year.

Figure 29 Standards pay-bill [102]

NB Jona Watson of Dowhill and his partner Tho. Fedding have a jack [contract] of the Standards for 7 years on parole from Michaelmas 1740 at a seventh duty. G. Bowes esq to have the refusal of buying their ore.

	B H	
Total of	23 2	at 45s per Bing comes to	£52.17.6
Deduct 3 $^{8}/_{14}$ for $^{1}/_{7}$ duty to GB			7.11.0
Remains 20 $^{6}/_{14}$ Bo[ugh]^{t} m[ore] oar		Due to them by M Dent as per ledger (Fo 214)	45.6.6

Figure 30 Nathan Horn's account of duty ore delivered for 1746

	bing
Lune Head ore delivered to Acton Mill	36. 0. 0
From Standards	37. 0. 0
From Arngill	23. 0. 0

Accounts could also be used as a control mechanism for contracts where there was no formal written agreement. This was true of the arrangements with London lightermen. The Company of Watermen and Lightermen controlled the London end of the coal trade.[103] Lightermen owned the lighters, a type of vessel that was used to transfer coal from the moored colliers to riverside wharves. They also acted as the principal intermediaries in the disposal of ships' cargoes in London, and could command a high premium from the Newcastle coal-owners for accepting their coal in a 'fighting trade', when the coal-owners were in all out competition. According to Flinn and Stoker, their monopolistic powers came to an end in 1730 when the City of London modified their charter.[104] However, the records of the Grand Allies show that the lightermen continued to be a major obstacle to the coal owners after that date (q.v. pp. 158-9).

Figure 31 Account of Bennett and Coltman, Lightermen, for premium (1728-1733) [105]

Billingsgate June 12 1736

A meeting this day with Mr Coltman and Bennett (Lightermen) it was agreed that their account for premium should commence at the year 1728 and from thence to and with the year 1733 it was stated as under.

Bennett & Coltman	Dr	Per contra		Cr
[Payments to them in 1723, 1724, 1728 and 1732 listed ....]		1728 By allowed their full claim for coals vended this year Cha 1175		
		1729 By do this year 3327		
		4502	@ 6d	112.11
		1730) No premium to be paid 1731) these 2 years		
	173.9.6	1732 By allowed for the coals vended this year as per A/C from Meekes office Cha 1558		
		1733 By agreed to this year's quantity 1425		
		2983	@ 3d	37. 5. 9
				149.16.9

The lightermen were paid on the basis of the quantities of coal taken. Therefore, accounts were needed to record what was due and how much had been paid. These took the form of ledgers, with a separate account for each lightermen, showing the numbers of chaldrons and vats taken by each.[106] The purpose of these accounts was summed up by an internal memorandum at Gibside in 1725:

> What's awaiting is the severall lighter men's several drawn up in one account of what chaldrons and vats each lighter men had taken of ye year ending 31 October 1724 and the same for this year 1725. By which one may easily see if their demands are right. In said account there ought to be credit given of what premium has been paid and when and by whom. Mr Jn Gibson accounts current will regulate that also.[107]

Figure 31 is an example of an account comparing the agreed premium for the previous five years to the payments on account. The account proved that Bennett and Coltman were not entitled to claim any more, and had in fact been overpaid in relation what had been finally agreed.

Finally, large bundles of instructions, demands, bills of exchange, mandates have survived that were originally sent by George Bowes to his London bankers, Francis Child and Co.,[108] who reciprocated by issuing regular bank statements to prove they had carried out his instructions. The first statement in the series that runs from June 1727 to October 1732 is summarised in Figure 32. A rough version of this

Figure 32 Francis Child Esq comp. to Geo. Bowes Esq [109]

1727			1727		
June 13	lodged	4,000 -- --	[Payments listed, including:]		
June 21		1,000 -- --	June 23	George Liddell in my bill to Abr. Fowler	800 -- --
			June 23	Cash paid to Wm. Leaton on my order	210 -- --
			June 27	John Gibson on A/C of premium	500 -- --
			- do-	- do - re salary and postage	200 -- --
			Oct. 13	c/fwd.	24.17.8
		£5,000 -- --			£5,000 -- --

statement was sealed and postmarked, revealing that it had been sent through the post originally and later transcribed.[110] A second series of statements exists for the period May 1747 to July 1770, prepared in the same format.[111] Income from stocks and

bonds was also paid through Child and Co., and recorded in a separate account. The investments were recorded at cost, and amounted to £13,358/1/10 in 1751, rising steadily to £26,688/1/10 by 1760. The income from investments was listed chronologically as it arose.[112]

Ridleys: Accounts were also used to enforce the terms of sale agreements for estates. This was true of Matthew White I and Nicholas Ridleys' purchase of the Earl of Derwentwater's forfeited estate at Plessey and Newsham in 1723. Matthew White III's acquisition of the freehold estate of John Lawson at Cramlington in March 1755 is another instance.[113] Both estates were purchased in instalments. The Cramlington estate was advertised in the London Gazette, and sold for £13,550. The first instalment of £3,000 fell due after nine months, and the balance after fifteen. £4,000 of the balance attracted interest at four percent, and £6,550 at three percent. Accounts were needed to ensure that the terms of the agreement were properly applied.

Internal audit

Internal audit checks increased the effectiveness of the accounts as a control mechanism. The 'presentments' of third parties were audited by estate stewards, who were themselves subject to audit by their superiors, which was common practice at the time. For example, the accounts of John Curr, the superintendent of the Duke of Norfolk's collieries, were audited by Vincent Eyre, the land agent, who held overall responsibility for the mines.[114] Audit of the Bowes accounts was evidenced by ticks, comments and signatures. There are a number of examples. The 1754 charge and discharge accounts of John Sedgwick, the manager of the partnership colliery at Northwood, were inscribed with the word 'examined', and signed by both John Sedgwick and his superior Richard Stephenson, the chief agent at Gibside. Similarly, the coal-subcontractors' presentments at Gibside were signed by the subcontractor, and countersigned by an estate agent.[115] Both subcontractor and agent signed the

subcontractor's control account to attest that it was 'right'.[116] The clause in the subcontractors' contracts obliging them to work under William Leaton's direction helped to preserve the quality of the workings (q.v. p. 91). A similar clause was inserted in the subcontracting agreements relating to Lord Dudley's coal mines in Staffordshire,[117] indicating that such clauses were not unusual. In the case of the Bowes' subcontractors, the clause was enforced through viewers' inspections, and the workings were signified as either 'good' or 'indifferent' in the subcontractors' presentments.[118] Finally, the reports, that compared the quantities of coal worked by the subcontractors with coal led, contained auditors ticks,[119] as did the Gibside establishment cash books [120] and the bank statements issued by Francis Child and Co.[121]

As we have seen, physical stock checks of materials and equipment were also an important internal audit mechanism (q.v. pp. 92-3). Furthermore, it was common practice to employ watchmen to safeguard such assets from theft. A Grand Allies schedule of the costs of sinking a pit at Birtley Fell included 3s paid to John Aislet for 'watching' the site for two weeks.[122] The first paragraph of Major Davison's 'observations made for the better management of North Biddick colliery' read as follows:

> That the viewer and staithman ought to reside upon the spott not only upon account of forwarding the work but to prevent the steeling of coals and other utensils from the staith and pits.[123]

The need for stewards to justify their accounts meant that supporting documentation had to be retained. This is illustrated by the annual charge and discharge accounts of John Sedgwick, the manager of the partnership colliery at Northwood, where there was a visible audit-trail.[124] A pocket-sized notebook contained rough weekly accounts of his expenditure at the mine.[125] A two-sided cash book listed receipts and payments. It was closed off on 31 December, and the last

page of the year was certified with the word 'examined'.[126] A debt book listed credit sales as they arose, which was totalled at the end of the year. Receipts from debtors were also listed as they arose, and the relevant sales ticked off.[127] Finally, the total debtors' balance was calculated from a listing of the individual accounts.[128]

Thomas Colpitt I's charge and discharge accounts at Streatlam and Wemmergill can also be traced back to the source documents,[129] as can those of James Miller, the agent for the South Shields salt pans between 1742 and 1755. Figure 33 shows extracts from the latter for 1751 and 1752. The disbursements in

Figure 33 Mr James Miller's accounts for year 1751 and 1752 [130]

Dr Mr James Miller to George Bowes Esq Cr

1751			
[Receipts such as house rents, cash from William Leaton listed chronologically ....]		[List of disbursements such as repairs, house expenses, salters' wages, land tax ....]	
Dec 31 balance due	18.14.10		
	62.19.10		62.19.10
1752			
[Receipts listed ....]		Balance	18.14.10
To balance	1. 1. 4	[Disbursements listed ....]	
		Miller's year's salary for 4 pans	8 -- --
	41. 8.10		41. 8.10

Received 1 July 1752 of George Bowes £1/1/4 [signed James Miller]

Miller's account were substantiated by the lists of expenditure that he was obliged to forward each month to Richard Stephenson, chief steward at Gibside, together with the vouchers.[131] These lists also underpinned the construction of summary profit statements for the salt pans, which are discussed below (q.v. pp. 137-8).

Ultimately, stewards would not be paid the moneys owing to them if they failed to produce the necessary receipts and vouchers. William Thompson, another agent at the South Shield salt pans (c.1760-1773), seems to have been particularly lax in this respect. In March 1761 he wrote to Stephenson informing him:

> According to your desire I have sent up the books [to Gibside], but it has not yet been convenient for ye Widdow [Mary Bowes] to pay the balance ...

The problem seems to have been a lack of vouchers, and in September 1761 he wrote:

> I believe I should get settled with the widdow provided I had the ticketts sent down for the coals you charged her with.

On the 2 June of the following year, he was still writing that 'the widdow will not pay the balance ... for want of the ticketts'. Thompson does not appear to have learnt from his omission, as on the 24 June he informed Stephenson:

> I have signed and enclosed the abstract of the account and had mislaid and omitted sending the vouchers which you may have whenever you think convenient.[132]

Ridleys: The same kind of audit procedures were employed on the Ridley estates. In 1767, for example, an annual rent summary for the North Blyth company was signed by the agent, and countersigned by Matthew Ridley. It contained a note to the effect that it had been 'examined with the vouchers and finally settled by and certified as witness our hands this day of August 1767.[133]

A more sophisticated audit report has survived from the 1780 accounts of the Middle Bottlehouse in which Sir Matthew White Ridley had a major share:

> We the undersigned being appointed by Catherine Henzell & Company, Proprietors of the Middle Bottlehouse, and by Deborah Hewitson on behalf of her husband Middleton Hewitson their late agent to examine the accompts down to the 30th December 1780, and accordingly met at their office for this purpose, several times, and find the Ballance of his Cash Accompt to be £737.1.8$^{1}/_{8}$ due from him at that Period to the Company - and have compared the Ballance Sheet with the Ledger and find the Ballances taken fairly off, as stated therein viz the amount of the Debts due to the Company £1725.15.9 and the Debts due from the Company to be £932.14.8 - leaving Nett Ballance amounting to £793.1.1 - and in regard to Stock taken the 30th December 1780 - of Bottles upon hand depending in the Warehouses here and at London and of materials upon hand, viz Kilp Ashes Clay Coals & Cullet - these being taken according to custom, by computation we consider as a computed stock, amounting in the whole to £2535.9.1 making the Nett Stock, 30th December 1780 - £3,998.16.11$^{5}/_{8}$.
>
> Errors excepted, Glasshouses 23 February 1781
> _____ For the Proprietors ..... [signed] .... Joseph Henzell
> For Deborah Hewitson James King [134]

The figures in this report came from one of the annual accounts of the Ridley glassworks discussed previously (q.v. pp. 104-5). The total 'nett stock' figure of £3,998.16.11$^{5}/_{8}$ does not quite agree to the sum of the other figures, as there are £66 additional creditors in the accounts which the report omits. Two auditors were involved, one appointed by the proprietors, and the other by the agent's family. It is unclear whether this was an annual exercise, or whether an audit had been implemented as a result of the agent's death. The basic idea of this audit was the same as for the estates - to verify the stewards' honesty - although, in certain respects, the procedures seem slacker. There is no mention of checking vouchers, for example, and the bottles and materials' stocks were computed rather than counted physically.

Returning to the original questions posed by the thesis, do these findings indicate either that the estates were managed efficiently as productive investments or

that the accounts aided managerial activity? The answer to both questions is only partly in the affirmative. The main purpose of the accounting procedures that have been examined in this chapter was to safeguard the interests of the proprietor. The fact that these procedures were extremely systematic as well as being versatile enough to accommodate a range of different situations shows that management were efficient in pursuing this aim, but does not imply that they were also efficient in terms of maximising profits. Similarly, although the accounts were an indispensable aid to management, in that without them the estate operation would have been unable to function, given its size and diversity, this is not the same as saying that the accounts aided *managerial* activity, if *managerialism* is defined in terms of the rational pursuit of profits or exercising disciplinary power over labour (q.v. pp. 18-19). However, we have not as yet seen the full picture. A range of other accounting data has survived that was more *managerial* in orientation, and less concerned with tracking rights and obligations, which is the subject matter of the remainder of the thesis.

Notes

1 Bennett et al, 1990: 98; Hatcher, 1993: 294-5

2 NUL: MSS/MISC/85/101-2

3 Edwards, 1989: 37-8

4 Oldroyd, 1998

5 DRO: D/ST/B1/2/2

6 DRO: D/ST/B1/2/2

7 Levine & Wrightson, 1991: 67

8 ibid: 65-6

9 Pollard, 1965: 7 & 41; Mingay, 1976: 98; Nunn, 1985: 235

10 DRO: D/ST/B1/6/277

11 DRO: D/ST/B1/6/18

12 DRO: D/ST/B1/6/277

13 DRO: D/ST/B1/2/7

14 DRO: D/ST/B1/2/31-32

15 Levine & Wrightson, 1991: 448

16 DRO: D/ST/B1/2/15

17 DRO: D/ST/B1/2/21

18 DRO: D/ST/B1/6/196, 198, 204-6, 207, 220, 255-7, 266

19 DRO: D/ST/B1/2/21

20 DRO: D/ST/B1/2/34/7

21 DRO: D/ST/B1/2/35

22 DRO: D/ST/B1/6/266/5

23 DRO: D/ST/B1/2/69/4 & 7

24 DRO: D/ST/B1/2/69/7

25 DRO: D/ST/B1/2/69/9

26 DRO: D/ST/B1/2/11/1-2

27 DRO: D/ST/B1/2/33/6 & 11

28 DRO: D/ST/B1/2/99

29 DRO: D/ST/B1/2/33/2

30 DRO: D/ST/B1/2/146

31 DRO: D/ST/B1/2/146, 148-153

32 DRO: D/ST/B1/2/147

33 DRO: D/ST/B1/2/170/1

34 DRO: D/ST/B1/2/ - 170/3; 174 & 176/1

35 DRO: D/ST/B1/5/2/7

36 DRO: D/ST/B1/6/1 & NR0: 3410, GA/1

37 DRO: D/ST/B1/6/77/1

38 DRO: D/ST/B1/6/77/5

39 DRO: D/ST/B1/6105

40 DRO: D/ST/B1/19/17/1

41 DRO: D/ST/B1/21/43/2-3

42 DRO: D/ST/B1/6106-8

43 DRO: D/ST/B1/6104, 114-7

44 DRO: D/ST/B1/6/28

45 DRO: D/ST/B1/6/279/2

46 Ellis, 1976: 154

47 DRO: D/ST/B3/21/4

48 DRO: D/ST/B3/26

49 DRO: D/ST/B3/32

50 NRO: ZR1/35/13

51 Scott, 1912, Vol. 2: 462

52 NRO: ZR1/37/1.1

53 letter from John Emmerton to Richard Ridley, 4 July 1730, NRO: ZR1/37/1.2

54 NRO: ZR1/37/3

55 NRO: ZR1/37/3/5, 8; ZR1/37/3/8

56 NRO: ZR1/39/12

57 Ridley, 1961 and 1962

58 NRO: ZR1/36/1

59 DRO: D/ST/E5/23/1

60 DRO: D/ST/B1/21/33

61 Hatcher, 1993: 300-1

62 Flinn & Stoker, 1984: 271

63 DRO: D/ST/B1/21/16

64 Hatcher, 1993: 558

65 Pollard, 1983

66 DRO: D/ST/B1/21/15

67 Pollard, 1983

68 DRO: D/ST/B1/21/25/4

69 DRO: D/ST/B1/21/1-13

70 DRO: D/ST/B1/21/38-39

71 DRO: D/ST/B1/19/10, 17/1

72 DRO: D/ST/B1/19/17/45

73 DRO: D/ST/B1/19/2

74 DRO: D/ST/B1/19/17/20

75 DRO: D/ST/B1/19/34-37

76 DRO: D/ST/B1/19/42/13

77 J.C. 1708

78 DRO: D/ST/B1/19/35

79 DRO: D/ST/B1/19/38

80 DRO: D/ST/B1/19/58

81 DRO: D/ST/E5/9/1-3

82 DRO: D/ST/E5/10

83 DRO: D/ST/E4/8/4

84 NRO; ZR1/37/1.2, 3; ZR1/41/1; ZR1/37/3/8

85 DRO: D/ST/E5/10/3

86 DRO: D/ST/E5/10/28/1

87 DRO: D/ST/E5/10/4

88 DRO: D/ST/E5/10/44-48

89 DRO: D/ST/C2/3/39/1

90 Hunt, 1970: 39

91 Turnbull, 1975: 21

92 DRO: D/ST/B2/103/4

93 DRO: D/ST/B2/103/1

94 ibid

95 Raistrick, 1965: 189; Hunt, 1970:5; Fairburn, 1993:29

96 DRO: D/ST/C2/3/39/2

97 Raistrick, 1965: 190

98 ibid, 1965: 189

99 Medlicott: 1981: 187

100 DRO: D/ST/B2/8, 10, 16, 18, 24, 29

101 DRO: D/ST/B1/105

102 DRO: D/ST/B2/125/1

103 Flinn & Stoker, 1984: 274

104 Ibid

105 DRO: D/ST/B1/22/64

106 DRO: D/ST/B1/22/61-2

107 DRO: D/ST/B1/22/60

108 DRO: D/ST/C1/3/64-65

109 DRO: D/ST/C1/3/62/4

110 DRO: D/ST/C1/3/62/5

111 DRO: D/ST/C1/3/66

112 DRO: D/ST/C1/3/68

113 NRO: ZR1/13/4; NRO: ZR1/18/8-9

114 Medlicott, 1981: 186

115 DRO: D/ST/B1/2/15

116 DRO: D/ST/B1/2/69/4

117 Raybould, 1973: 188

118 DRO: D/ST/B1/2/31-2

119 DRO: D/ST/B1/2/34/7

120 DRO: D/ST/E5/5/14

121 DRO: D/ST/C1/3/62/5

122 DRO: D/ST/B1/6/199

123 DRO: D/ST/B1/6/234

124 DRO: D/ST/B1/2/164 & 173

125 DRO: D/ST/B1/2/168

126 DRO: D/ST/B1/2/154 & 156

127 DRO: D/ST/B1/2/155-156

128 DRO: D/ST/B1/2/156

129 DRO: D/ST/E1/6/1, 4, 5, 24

130 DRO: D/ST/B3/8/9

131 DRO: D/ST/B3/8/7

132 DRO: D/ST/C2/3/80

133 NRO: ZR1/37/1.2

134 NRO: ZR1/36/1

5

FUNCTION OF ACCOUNTS WITHIN THE ORGANISATION (II)

Maximising profitability

Was profit maximisation an issue on the estates? The survival of cost analyses, profit statements and planning data indicates that it was. Although these types of account are in a minority compared to the number that were concerned with safeguarding the proprietor's rights, the fact that they are not restricted to particular dates or industries suggests they are not merely exceptions.

Cost analysis

The analysis contained within some of the estates' cash books shows that the stewards were interested in tracking and monitoring expenses. Fleischman and Parker identified this as the 'necessary first step' in the development of an effective costing system. It focussed the attention of management on the relationship between costs and profitability, and provided the data that was needed for other costing activities such as product costing, cost comparisons and decision making.[1] There are many examples in the Bowes papers where expenses were analysed.

The Marley Hill cash book listed the colliery's expenses under headings of 'working charges', 'contingent charges', 'stable charges' and 'wagonway charges'. The working charges comprised the bill of Abraham Laverick, a subcontractor, for working the various pits. The contingent charges seem to have been any additional working expenses, such as pitmen's wages, candles, smith-work and delivering planks to the pit. The stable charges consisted of wages and oats. The wagonway charges included greasing, repairs and shovelling snow.[2]

Weekly staith bills analysed the costs relating to the transportation and storage of coal at the staith. Figure 34 is a typical example. These reports kept a running total

Figure 34

44 An account of coals led to Dunston staith from several collieries and delivered there on account of George Bowes Esq from 29 November to and with 6 December 1738. As also the charge thereof [3]
viz

		Total wagg	Total T W	Charge leading	
Led this week	[separate	414	18 18	32. 2.0	
formerly	columns for each	29630	1346 18	2276.15.4	
	colliery]	30044	1365 14	2308.17.4	2308.17.4.

Last 5 pay bills ending	Way[leave] charge	447.11. 7	
27 September 1738	Waggon[way] charge	318. 1.10	
			765.13.5
Running charge from 31 October 1737 to and with 1 March 1738			53. 0. 5
Running charge this week [Details given]		3. 6. 8	
Running charge from 1 March 1738 to 29 November 1738		221. 1.11	
			224. 8. 7
		Summa	£3351.19.9

of the costs to date and quantity of coal led to the staith in addition to the weekly figures. Juxtaposing costs with output lent itself to the type of unit cost calculations that underlay most of the planning schedules prepared by colliery viewers (q.v. pp. 76-7). The number in the top left hand corner of this particular report signified it was the forty-fourth in the sequence. The fact that the wayleave and wagonway charges only ran till 27 September shows that they were updated when new pay bills were received, which was not necessarily weekly.

The pro-forma scheme of lead accounts, shown in Appendix 2 and discussed above (q.v. pp. 73-4), incorporated cost analysis. The costs charged to the mine and mill accounts were recorded under separate headings, and the final page of the exemplar appears to be a weekly or monthly cost analysis sheet relating to the following year. The actual lead accounts also analysed costs. For instance, schedules have survived showing the build-up of the figures of ore carriage, sinking and drifting, winning ore and contingent charges that were included in the 1742 lead account (Appendix 3). Figure 35 contains the details. With the exception of the charge for Grove Wood, where there was a small difference (which is partly due to a miscalculation of the payment due to John Dalston), all of these figures agreed to the 1742 lead account. This account provided a profit summary of the whole operation, and the schedules a means of assessing the impact of the individual costs.

Figure 35 Charges to the 1742 lead account [4]

Ore carriage collected [listed by carrier]

William Wearmouth

		B	H	[bings/horses]
1742	May 26	1	3	
	....			
	Oct 5	1	3	
£11/4/0		56	--	[agrees to ore carriage summary below]

Ore carriage collected summary

	B	H	At 4s per bing
William Wearmouth	56		£11/4/0
....			
John Boyles	--	2	-- 2 --
	557		£111/8 --

Sinking and drifting charge

	Fm [fathoms]		
Guy Allason & Partners			
Driving in the low levels	2	at 6s	£-- 12 --
do	10	at 14s	7 -- --
do at Melican Shaft	2	at 7s	-- 14 --
....			
			106.18.9

Charge of winning ore at Isab. M. Hill

	B H	
George Morrow & Brown		
Winning ore at Robinson shaft at 12s	20	£12 -- --
....		
		313.16.1 1/2

1742
Charge of Grove Wood

	Doz			
John Dalston for	640	at 14d per doz	£26. 16. 8	
John Wilson	29	at do	1. 13.10	
				28.10. 6
Carriage				
Robert Yare for	29	at 12d per doz	1. 9 --	
....				
				24. 2. 4
				52.12.10

Contingency charges at the mine

Kibbles, pick shafts, water tubs etc. listed totalling	6.4.10 1/2

Controlling costs through cost analysis did not just apply to commercial activities, but to the household also. Each of the items listed in the Gibside establishment expenditure book for the two-and-a-half years to the 29 June 1725 was categorised with a letter for further analysis. Examples are noted in Figure 36. The

Figure 36 Items from the Gibside establishment account 31 December 1722 to 29 June 1725 [5]

P[etty charges]	H[ouse expenses]	E[lection]
Cleaning swords	Lemons	Bill at Belford
Black ribbon	Eggs	Mr Stenton's bill
Paid at church	Butter	To an old burgess and his wife
Bill for ye horses	Cream	
Two old women	Flowers	Barber at Alnwick
Gloves	Game	To a bill at Alnwick for dinner
Board wages		

S[ervants]	C[ontingent]
To making of shawls for ye boys	Sending for Dr Mead
Mr Bell for silver lace	Sending for ye surgeon
2 hatts	Gloves
24 yds of cloth for ye boys	
Britches for ye boys	

Gibside establishment expenditure book for the year ended 31 December 1736 was more sophisticated, and listed the expenses under separate headings of wood/plantations, farm expenses, house accounts, garden expenses, keepers' expenses, stable expenses, gratuities/donations. Sub-totals were extracted at the end of each page, and totals at the end of the year.[6] Separate accounts have survived for food/other household items, housekeeping, food/domestic work, dairy produce/laundry work and larder at various points in time.[7] However, this level of detail was not matched by the household accounts of the Streatlam estate. Here the expenditure was listed in chronological order without analysis.[8] Streatlam was a

secondary residence to Gibside during George Bowes' lifetime, and the relative unsophistication of its household accounts reflects this.

The analysis of costs in cash books that were also used to keep track of rights and obligations supports Boyns et al's conviction that management accounting and financial accounting had a common root, and were not separate activities.[9] The profit statement for the Burdon salt pans referred to below (q.v. p. 137) is an example. The expenses that were charged to this account were derived from the same detailed schedules of disbursements that formed the basis of the charge and discharge statements of James Miller, the agent. One of the main findings of an investigation by Edwards and Boyns into iron-making in Sheffield between 1690 and 1783 was that 'an integrated system of financial/management accounting was in use in 1690'.[10] However, the extent to which such integration was general practice is a matter of debate. Fleischman and Parker, for example, observed that the pre 1786 records of the Carron ironworks in Scotland, 'reflected all the correct instincts about cost accounting methodologies but a failure to integrate costing with acceptable financial reporting'.[11] Similarly, a review of twenty-five sizeable British firms, mainly in iron and textiles, between 1760 and 1850, revealed that 'costing activities were rarely reported in financial accounting records'.[12]

Profit statements

The survival of *ex post* (retrospective) profit statements for coal, lead and salt demonstrates an interest in the profitability of these activities. These schedules were not financial accounts of the proprietor's rights and obligations. As the thesis has shown, other types of account served that purpose, and the notion of using profits to calculate dividends did not apply. The latter may have occurred at certain of the company undertakings of the Ridley family - an 'account of profits and loss' has survived for the Laurence Bottle House in 1795,[13] which was probably used to arrive

at the 'profit dividend' figures paid to the proprietors (q.v. p. 104) - but it was not true of the Bowes.

Summary profit and loss accounts were prepared for Marley Hill colliery for the years 1772 to 1773, and 1775 to 1778. The account for 1772 is shown in Figure 37. These summaries were derived from detailed annual profit statements, which took

Figure 37 Marley Hill profit statement 1772 [14]

	Dr		Cr
31.12.1772			
Expenses of working the colliery this year, horses, hay, corn and horsekeepers' wages	2,803. 6.3	Cash received for coals and for own horses drawing this year	5,040.15.8
Profit gained this year	2,237. 9.5		
	5,040.15.8		

closing stock into account, together with accruals for 'notes given in since and not included in the working charges'.[15] The latter shows an appreciation of the need for an accurate allocation of expenses between the accounting periods to which they related. Calculating profits on an accruals basis was advanced for the time.[16] Charles Montagu put the concept nicely in a letter in August 1694, requesting details of his cousin Francis' rent arrears. He wrote that he needed the information, 'purely to satisfy me how my fortune and expenses go together'.[17] Calculating profits on an annual periodic basis was also advanced. It was more common to calculate them only occasionally, perhaps 'when there was a change of partners or because the ledgers were full'.[18]

Profit and loss accounts for lead were discussed in the previous section. In addition to these overall profit statements, an *ex post* analysis has survived (c.1740) that showed the unit profit of a batch of lead. The unit cost of mining, smelting and delivery was calculated at £11/10s, which, compared to a selling price of £12/10s, resulted in a net profit of £1 a fother.[19]

A profit statement for Middleton's salt pans showed a loss of £199 for the period 1757 to 1760, and calculated that this loss would have been reduced by £151, had it been possible to maintain a selling price of 40s a ton, instead of the actual prices

Figure 38 Profit and loss account Burdons panns for several years [20]

	Tens	Bushels			Tens	Bushels	
1742				1743			
Dec 31 To bal	316	36	395. 4.12	Dec 31			
Coal delivered			231.15. 9	Sales	314	34	382. 3. 9
Iron pan plates			50. 3.10	By bal	300	--	638. 9. 8
Payments J Miller for making salt	297	38	230.16. 4				
Raff delivered			12.12. 6				
One year's rent 8 pans			100 -- --				
	614	34	1020.13.5		614	34	1020.13.5
1743							
Dec 31 To bal			638. 9.8				
[1744, 1745, 1746, 1747, 1748, 1749, 1750, 1751 ....]							
To profit and loss gained			207.12.3	By bal resting at 40s per ton	180	--	360 -- --
	499	24	1264. 3.10		499	24	1264. 3.10

which ranged from 28 to 40s.[21] Profits or losses on salt were calculated either on an annual basis, or over an extended time period. An example of the former is a profit and loss account for each of the various salt pans for the year ended 31 December 1750.[22] Figure 38 above shows extracts from a ten year profit statement. This account recorded income and expenses on an annual basis. However, profit or loss was not recognised annually. It was carried forward each year as part of the figure of closing stock, until the final year, when the total profit of £207/12/3 for the ten years was recognised. A similar summary exists for the Middleton pans, except that it was not closed off annually. It showed a profit of £47/18/9 for the eight years to 31 December 1751, and a closing stock of 220 tons, priced at 40s a ton.[23]

Retrospective profit statements have been observed in use on other north-eastern estates in the eighteenth century, suggesting they were not unusual. Beastall, for example, found them in use on the Lumleys' estate in County Durham. Here the average annual profits from coal mining were calculated at £1,894 for six years' workings (1723-1729). A detailed profit and loss account was prepared for the Lumley coal operations in 1730, which identified eleven different categories of expense.[24] Ellis referred to a few surviving profit statements for William Cotesworth's collieries.[25] Flinn and Stoker cited a number of others, but questioned their accuracy.[26]

Previous authors have questioned the ability of estate accounts to measure profits accurately. Pollard's criticism that estate accounts were flawed because they did not group together incomes with the appropriate expenditures does not apply to the Bowes. [27] His contention that they were ineffective because they confused capital and revenue expenditure is less easy to refute, as the Bowes accounts tended to treat both in the same way. For instance, £50/3/10 for iron pan plates was debited to the profit and loss account of Burdon's salt pans for the year ended 31 December 1751 alongside the operating expenses (Figure 38).

How relevant was the distinction between capital and revenue expenditure to the estates? From the point of view of securing the proprietor's rights, it was of no significance, providing there were inventories to keep track of the whereabouts of equipment. This was common practice. For example, a schedule of the equipment on site was attached to the 1692 lease agreement for Gibside colliery (Figure 39).

Figure 39 Coal engines and equipment belonging to Gibside colliery 1692 [28]

Three old oak engines standing at Norbanks valued and apprized	28 00 00
Ropes, hooks and chains	52 05 00
Barrows, shovels, sledges	01 10 00

Similarly, year end inventories were compiled at Northwood colliery that listed, priced and totalled the various items. The fact that the Northwood equipment was listed in the same order each year, with sometimes no movement in quantity or price, indicates that the previous year's inventory was referred to in compiling the current one.[29] Inventories were kept at North Banks colliery at Gibside, not just of trams, deals,

Figure 40 Simon Cummings' account of rails and sleepers lying in North Banks 5th February 1725 [30]

	Sleep that will lay	Sleep that will not lay	New rails resting	Old rails
Resting in Rab. Wheatley Ground	9	33	15	292
Resting in Jn Collingwood Ground				
[Other locations listed]				
	440	787	35	498

shovels etc., but also of wagonway materials. Figure 40 shows an extract from an account of rails and sleepers prepared by Simon Cummings in 1725. Cummings, the agent, signed the document to attest that it was correct. An inventory listed and valued the coal gins (winding apparatus) at three of the Grand Allies' collieries in 1737,[31] and, finally, an inventory of farm implements was taken at Gibside in 1744, which listed and priced the various tools, carts and wains.[32]

Whether distinguishing capital from revenue mattered as far as measuring profits was concerned depended on the length of the reporting period and the size of the outlay. The difference between capital and revenue expenditure disappears over the full life of an undertaking, as ultimately all assets are consumed or sold, and translated into profits or losses. Therefore, the longer the reporting period, the less relevant is the distinction between the two. As noted above, it was not uncommon for profit statements to cover a number of years. Furthermore, in a situation where most of the work was undertaken manually or by horse, the distinction between capital and revenue expenditure was less significant still. Coal mining at Gibside was not capital intensive, owing to the availability of plentiful coal reserves at a shallow depth.[33] In 1787 a view book estimated the mean depth of the Gibside collieries at thirty-six fathoms,[34] compared to the sixty fathoms said to be normal by *The Compleat Collier* eighty years earlier.[35] Brian Davison, a subcontractor in the 1720s and 30s, compiled a list of pits at North Banks containing approximately sixty entries.[36] The large number of pits indicates relatively shallow mining, with minimal site preparation costs. Sinking itself was not particularly a major outlay, the whole work being done manually; and it was not uncommon to sink another pit in order to minimise the cost of underground haulage.[37] The costs of sinking a shaft at Northwood in 1753, for example, amounted to £74 only.[38] Even by 1826, when £6,000 capital expenditure was needed to mine the Low Main seam at Marley Hill, Gibside, the two most expensive components were £1,110 for an extension to the wagonway, and £765 for horses.[39] Malley found a similar situation on the Duke of Bridgewater's Worsley

estate, where the sinking costs 'were not very heavy', and where 'the chief cost of working the mines' related to the ongoing running expenses such as:

> the upkeep of the existing levels and waggon roads, the expense of repairs, the work of labourers, and carpenters in the mines, and the charges of bringing coals from the coal face to the navigable soughs [underground waterways] and thence to the open canal.[40]

Free drainage sufficed at the Gibside mines, thereby avoiding the heavy capital costs associated with steam-pumping. This was not the case at the Ridley mines to the east of Newcastle, where viewers estimated the costs of a new engine at £849/16 in 1733 [41] and £1,200 in 1746.[42] Unfortunately, associated profit statements have not survived.

Planning data

A wide range of planning data has survived relating to the Bowes estates. Some of it quantified the future cash or capital requirements. Other documents appraised the future profitability of particular operations or investments, calculated the present value of future cash flows, or evaluated the outcomes of alternative courses of action in order to decide which was best.

One of the earliest surviving planning schedules was compiled by Charles Montagu, who leased the estate mines at Gibside from 1692 to 1723. It is a cash-flow forecast for the summer of 1696 that attempted to quantify the mine's cash requirements (Figure 41). The statement commenced by estimating the cash outflows arising from the new season's mine workings, and then went on to consider how these would be funded. Most of the expenditure would come out of the rents received by the agent, George Baker, although Montagu identified slow payment by the tenants as a potential problem. This schedule is characteristic of the very systematic approach

Figure 41 An Account (by supposition) of what money will be required for paying and managing Gibside colliery till Mart[inmas - 11 November] 1696 Being about thirty weeks at most

Rent for May day last	122 - 10 - 0	
Lamas next	122 - 10 - 0	
Mart. next	122 - 10 - 0	
		367 : 10 : 0
Sinking & Drifting etc at £3 per week for 30 weeks -		90 : 0 : 0
Working 11 tens per week after the rate of 25s per ten -		367 : 10 : 0
[This seems to be a miscalculation, as the correct amount is £412/10]		
Leadings 30 weeks at 20 tens per week one with another after the rate of 40s per ten is -		1200 : 0 : 0
Salaries, staith charges, way leaves, keel-rooms, and other accidental charges about £5 per week for 30 weeks -		150 : 0 : 0
		Total £2175 : 0 : 0

To pay which I propose my Mart[inmas] and Candlemas rents last past in Carrs hands, and his balance in all about -	300}	
Whitsuntide & Lamas 96 about -	250}	1050 : 0 : 0
Mart. 96 about -	200}	
Cousin Fra. Bakers rents in the same time ...	300}	
Now money in Bro: Rogers hand -		600 : 0 : 0
Bro: Do: rents within that time about -		300 : 0 : 0
Interest money about -		150 : 0 : 0
		2100 : 0 : 0

By this you see I compute the greatest part of cash for this summers management to arise from your hands. But I fear Carrs payments and all tenants will be very slow, of which I desire your present thoughts and information as they prove, after you have examined Carr

that Montagu applied to mine management, which routinely involved quantifying future outcomes.

Hatcher described the contents of Montagu's letters as being 'so stuffed full of calculations, projections, and suppositions' as to indicate that

> Montagu believed in deep reflection before he made decisions, and in approaching major issues from a variety of perspectives.[43]

Viewers' reports and computations were obtained on the prospects for reopening Benwell colliery after a flood, for example, which quantified the costs and revenues.[44] His greatest capital scheme was to construct a wagonway (horse-drawn railway) from Gibside to the Tyne (the Dunston Way), a distance of some five miles, and his letters contain much evidence of planning. The project was completed in May 1699, and took more than three years to execute. Previously, the coal had been transported to the Tyne along roads by wains (carts). Writing about the inception of wagonways in general, Bennett et al observed:

> For the general acceptance and implementation of this revolutionary transport system there were two reasons, cost and handling capacity, and they were of equal importance. Today the cost of transporting by road a load of sand or gravel for 30 miles equals that of its extraction; for seventeenth century coal there was a similar doubling of costs after a mere two or three miles, but waggonways were to extend this distance threefold to nearly ten miles.[45]

Wagons held twice as much coal as wains, moved it faster in all weather conditions, and needed relatively less horse-power.[46] Montagu's letters appraised these advantages, as well as the costs of construction and the source of funds for the project. Projections were prepared comparing alternative routes:

> Should it proceed to Smallwell, Dunston, or Derwent staithes, what were the respective distances and the ease of transport and construction of these alternatives, which route posed the fewest problems in securing wayleaves, in

> which destination were the staithes likely to prove the most suitable from the points of view of access, keelrooms, depth of water, and vend, what economies could be made on current production and leading costs, and perhaps most important of all, what would be the carrying capacity of the wagonway, and could all the coal be sold? [47]

In July 1696 Montagu estimated that it might be possible to raise annual production at Gibside to a level of four to five thousand tens.[48] The estate records indicate that output then stood at around seven hundred tens per year. Although this estimate proved excessive, production did increase three to fourfold with the new wagonway.[49]

Levine and Wrightson described Montagu as a 'talented opportunist' with 'entrepreneurial vision' who was willing to take risks.[50] Shortly after acquiring the Gibside lease, he himself had said 'I am now such a Trader in the World as to know all profits depend on Trade and Trade on Chance.' He realised at the outset that the profitability of the lease depended on the building of a wagonway, and ensured that a term was inserted in the agreement allowing him to construct one.[51] The superior quality of the Gibside coal, which made it sought after in London, was in his favour. Against, was the sluggish coal-market of the late seventeenth century. Despite the risks, Montagu was willing to commit large amounts of capital to the project - he said he was 'out of pocket' by £7,000 in 1699-1700 [52] - without a cast-iron guarantee of the returns. However, the careful and systematic quantification of future outcomes in his letters shows that he was not a reckless gambler. He was prepared to accept risks, but used accounting projections to reduce them as much as possible.

The Bowes papers contain other examples of planning data on the estates. Output was projected at North Banks colliery at various dates on the basis of viewers' surveys of the remaining coal reserves. In 1725 Anthony Leaton (snr.) calculated the coal remaining in the Letch and Barne pits:

> Coals left standing in the pillars in the Letch pitt. Dividing the coal equally between Letch and Barne pits, I find there is 3,630 superficial yards of coal which at 7.5 quarters in height will be 6,809 solid yards of coal .... [producing] 130 tenns, 6 waggons, 18 bowles. Which 130 6 18 may [also] be wrought at the Barne Pitt.[53]

In 1735 output at Green's pit was projected at 120 tens over eighteen weeks.[54] A similar schedule projected the output of the Harlech, Ore, Dyke and Dean pits in 1737.[55] William Leaton wrote to George Bowes in 1728 concerning Beckley colliery, which neighboured the estate mines at North Banks. He calculated that the cost of draining Beckley via a drift out of Gill pit in Cawsey colliery to be £227/10s, compared to the present annual cost of drainage which amounted to £600. Furthermore, the proposed drift would allow the estate to mine the hitherto inaccessible 'part of North Banks that's under ye Dyke out of Beckley'. On this basis, he urged that the work should be undertaken.[56]

A valuation of woodland in 1763 was based on estimated future cash flows from timber, discounted using compound interest tables to their present value, thus taking into consideration both the cost of capital and the time value of money (Figure 42). A separate schedule estimated the value of the *weedings* at each period of time. The *weedings* must have represented new growth, as the final valuation figure of £4,925 was made up of the £877 in Figure 42 plus £4,050 in respect of current trees. Discounting in forestry valuation was not uncommon on eighteenth century estates; and in 1730 John Richards, a surveyor, produced a guide for estate owners which provided examples that could be applied in different situations.[57] In this particular instance, the valuation was connected to the purchase of the wood by Mary Bowes (George Bowes' widow). There seems to have been some double-counting, as the terms of the sale were that Mrs Bowes would pay the £4,925 on signing the deed, and a further £2,087 at the end of the forty years. However, the residual value of £2,087 had already been taken into account in the present value calculation (296 = 2087

discounted at 5%), suggesting that although the technique of using discounting in projections was known to the estate stewards, it was not perfectly understood.

Figure 42 An estimate showing the value of the Spring Wood at Lockhaugh at a period of 40 years from May 1763 [58]

For the present value viz	
Of the corf rodds For 40 years to come at 5% compound interest	£329.0.0
Of the weedings cutt at different periods of time viz	
£45 at the end of the first 12 years discounting at the rate of 5% compound interest	25.0.0
£108.6.8 at the end of 21 years discounting at the rate of 5% compound interest	38.0.0
£700.18.6 at the end of 30 years discounting at the rate of 5% per annum compound interest	161.0.0
£479.18.0 at the end of 40 years discounting at the rate of 5% per annum compound interest	68.0.0
Of the wood standing at the end of 40 years viz	
£2,087.10.0 discounting at the rate of 5% per annum compound interest	296.0.0
In all	917.0.0
Deduct for making a fence to preserve the spring	40.0.0
	£877.0.0

In 1762 the unit cost of producing lead at Birkdale and Lunehead was projected, with a 2s/3d difference in favour of Birkdale (Figure 43). Apart from the difference in the cost of extracting the ore - forty-nine shillings compared to forty-five - less ore would be needed to produce a saleable fother at Birkdale because it was of a

better quality, whereas the cost of carriage to the mill would be greater as it was further away.

Figure 43 Account showing the quantity of ore at Birkdale and Lunehead that will be a fother of lead down at Dunston [59]

1762 Birkdale ore the produce

Four bing and one horse at 49s per bing	10. 8. 3
Carriage to the mill at 9d per horse	12. 9
Smelting per fother	10 --
Carriage of lead to Newcastle per fother	1. 5 --
	£12. 16. 0

Lunehead ore the produce by Jonathon Watson

Four bing and 3 horse at 45s per bing	10. 13. 9
Carriage to the mill at 6d per horse	9. 6
Smelting per fother with fuel	10 --
Carriage of lead to Newcastle per fother	1. 5 --
	£12. 18. 3

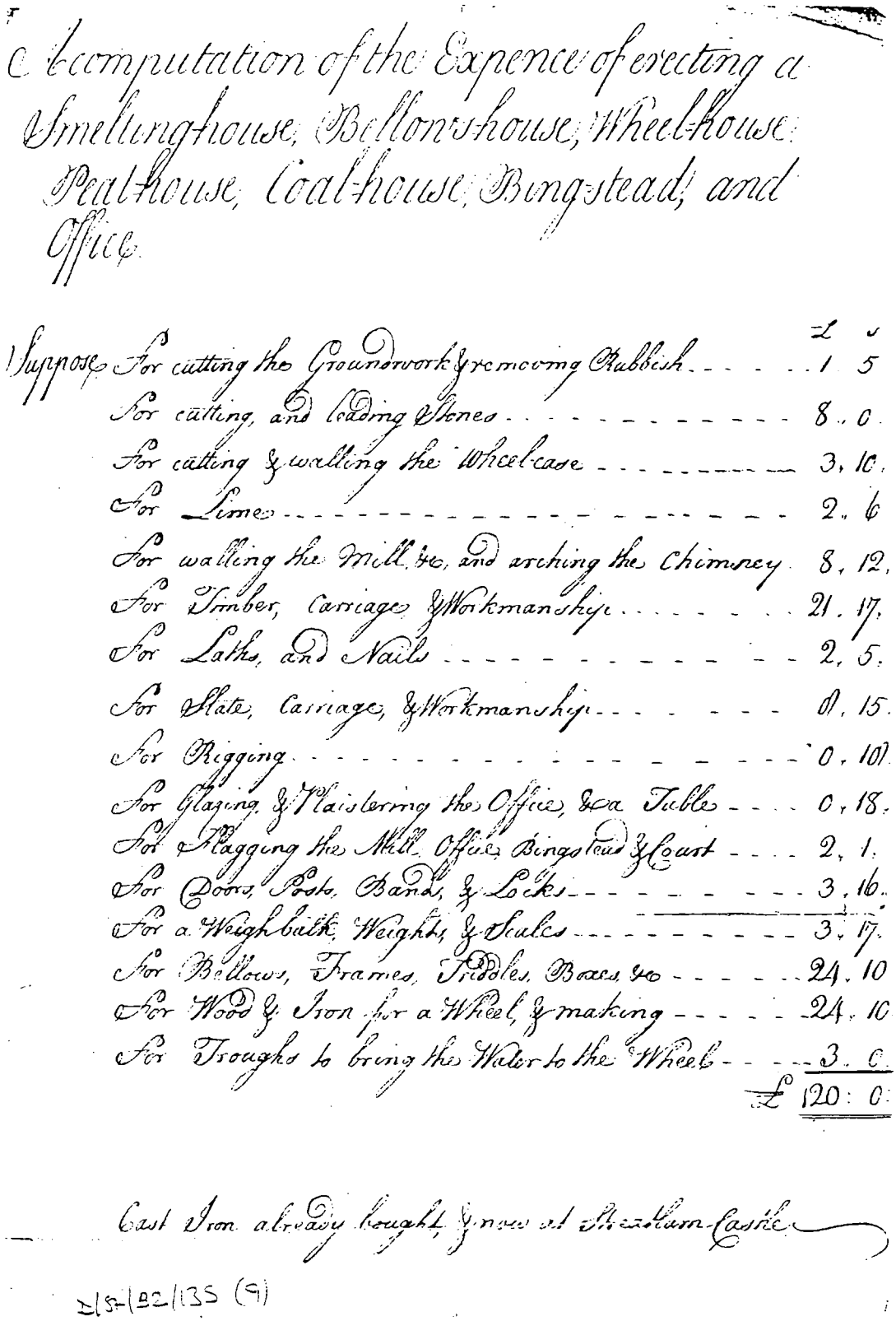
There are a number of examples relating specifically to lead smelting where projections underlay business decisions. In 1763 the decision was taken to sell a consignment of lead ore, rather than smelt it and sell the finished product at Newcastle, on the basis of a computation that showed the total cost of the lead at £17/10s per fother if it were processed and transported to Newcastle, which figure exceeded the market price there.[60] In 1742 the decision under consideration was whether to build a new mill at Isabell Meah Hill where the lead was mined, or to continue to use the existing mill at Boylup, the main difference being the transportation costs. Taking into account the capacity of the mine and the differential costs of carriage, a computation showed that a new mill would result in a saving of £59/8/4 on 600 bing of oar (Figure 44). Other computations compared the unit

Figure 44 The difference between smelting at Boylup and the building a new mill at Isabell-Meah-Hill [61]

		Bing	
1742	May 1 Oar then on the field	200	
	Sep 29 Computed quantity that may be wrought and carried to Boylup to this time	400	
			600
	B		
Carriage of 600 from Isabel Meah Hill to Boylup at 4/8			£140
Carriage of 130 fother lead from Boylup to Woolsingham [presumably the market] at 3/4			22.3.4
Mill rent 1/2 year			5 ----
			167.3.4
If a mill built at Isabell Hill then the charge will be as under			
	B		
Carriage of 600 from the mine to the mill at 8d			£20
Lead carriage from the mill to Woolsingham at 13/6 a fother on 130 fothers, and allowance being made for the piggs weighing at New Mill 10 stone, those at Boylup being 11 stone			87.15
			£107.15.0
Yearly saving on 600 bing of oar			59. 8.4
			167.3.4

operating costs of mills at Staindrop, 'ye Mind' and Holwick to see which would be the cheapest to run.[62] These computations were related to the decision about where to build a new smelting mill. In this respect, estimates were also made of the capital costs of construction at the various locations. One of these schedules is reproduced in Figure 45. The exclusion from the above computation of the cast iron that had already

Figure 45 New smelting mill [63]



A Computation of the Expence of erecting a Smelting-house, Bellows-house, Wheel-house, Coal-house, Bing-stead, and Office.

	£	s
I suppose For cutting the Groundwork & removing Rubbish	1	5
For cutting, and loading Stones	8	0
For cutting & walling the Wheel-case	3	10
For Lime	2	6
For walling the Mill &c, and arching the Chimney	8	12
For Timber, Carriage & Workmanship	21	17
For Laths, and Nails	2	5
For Slate, Carriage, & Workmanship	0	15
For Rigging	0	10
For Glazing & Plaistering the Office, & a Table	0	18
For Flagging the Mill, Office, Bing-stead & Court	2	1
For Doors, Posts, Bands, & Locks	3	16
For a Weigh-batch, Weights, & Scales	3	17
For Bellows, Frames, Riddles, Boxes &c	24	10
For Wood & Iron for a Wheel, & making	24	10
For Troughs to bring the Water to the Wheel	3	0
	£ 120	0

Cast Iron already bought, & now at Alnwick-Castle

been bought suggests an appreciation of the distinction between *sunk* (past) costs and *incremental* (additional) costs in decision making. Comparing the incremental costs arising through alternative courses of action was characteristic of the financial estimates prepared by colliery viewers. It is not therefore surprising that two of these schedules are noted as having been were prepared by the eminent viewer, Nicholas Walton, in conjunction with a Mr Boag, confirming that viewers were instrumental in disseminating costing methods to related industries.[64]

In contrast to the *ex post* profit statements referred to in the previous section, there was a clear distinction in these projections between capital and revenue expenditure, with the costs of building the new smelting mills and the ongoing running expenses being treated separately. Furthermore, the terms of the lease of a paper mill at Gibside demonstrate that the estate was aware of the need to obtain an adequate return on investment. The estate agreed to construct a new engine at the outset of the thirty-one year lease in return for increased annual rent, calculated at 1s/6d in the pound in respect of expenditure exceeding £20.[65] This was equivalent to an annual return of seven-and-a-half percent, compared to the prevailing rate of interest of five.

These findings run contrary to Pollard's observations regarding the inadequacies of Industrial Revolution accounting as an aid to managerial activity.[66] The surviving cost analyses, profit statements and planning schedules show that profit maximisation was an important issue on the Bowes estates - they were not simply treated as units of consumption - and that the accounts played an important facilitating role. How typical was this of other landowners in the region? The records of George Bowes' associated activity, the Grand Allies' partnership, allow us to consider this, as do the records of the rival White-Ridley axis.

The Grand Allies [67]

The Grand Allies' records are rich in planning data. Their minute book is the main source, as it contains copies of the planning schedules presented to the meetings by the partnership's viewers. Two points relevant to planning emerge from the partnership agreement (q.v. p. 98). First, the December year-end reflected the seasonal nature of the coal trade. It was not until 1760 that the Tyne coal-ships began to make the voyage to London all year round.[68] Previously the sale of coals had taken place 'chiefly in summer by reason of the weather, which makes it hazardous for ships to sail in winter on those coasts'.[69] It is probably not coincidental, therefore, that many of the Grand Allies' planning schedules were prepared between the months of October and February, looking ahead to next year's sales. Second, the partnership agreement reflected the customary separation of the production and selling functions of coal - although it was produced jointly it was sold by the individual partners separately (q.v. p. 97). Consequently, the emphasis in the partnership's costings was on determining production costs rather than selling price. There is no evidence in the minute book that the costing reports were used in pricing decisions. The selling price of coal seems to have been a function of the market, both when it was regulated and when it was not.

The most common type of computation in the Grand Allies' minute book is the calculation of cost/profit per unit of output, measured in 'tens'. The ten was the standard coal measure used in the production of coal. As we have seen, this type of calculation was characteristic of the forecasting techniques of colliery viewers (q.v. p. 76). There are thirteen occasions in part one of the book where unit cost/profit calculations were presented to partnership meetings between 1727 and 1736. Part two of the book, which consists of further colliery views and computations, records twelve instances between 1728 and 1738. In 1734, for example, the cost per ten was

calculated for Cawsey Colliery and compared with the selling price to yield a figure of unit profit (Figure 46). This type of calculation was based on estimates of output,

Figure 46 A computation of the charge of working and leading [Cawsey Colliery in 1734] and the profit it will yield [70]

Working £1.13.6, Leading 34s 10	£3. 8. 4
Way and wagons 14s 6, Rent 12s 6	1. 7 --
Contingency charges 2s, Staith 2s 6	-- 4. 6
Wayleaves, staith rents and water courses	-- 10 --
	5. 9. 10
Will make 19 4/10 chaldrons at 9s 9 1/2	9. 9. 11 1/2
Profit	£4 -- 1 1/2

initially derived from colliery 'views' (viewers' assessments). An example is John Barnes and John Bullocks' proposal in 1727 for winning Heaton Colliery, which involved an engine and an engine pit. The capacity of the mine was estimated at 8,000 tens for the first working, with a further 4,000 tens if the supporting walls could be worked. This capacity was then used to calculate the unit cost of sinking (Figure 47), and the resulting figure of 12d per ten was incorporated into the computation of

Figure 47 Computation of the sinking cost of Heaton colliery, 1727 [71]

Sinking first pit at Heaton	£ 45
100 yards of drift to the second pit	100
Sinking second coal pit and water drift	200
Cribbing and stopping	45
Drawing water whilst sinking at 15 fathoms below Tyne level	80
	£470
Cost per ten on 8,000 tens	15d

If walls can be worked on 12,000 tens this would become 9 1/2d per ten. But it would not be above 12d per ten.

unit profit which followed. Unit profit took depreciation into account, therefore, as the capital costs of the mine were apportioned in proportion to output over its estimated useful life. There are other examples of the calculation of the various components of unit cost. Figure 48, for example, details the calculation of the 10s charge for wayleaves, staith rents and water courses, noted in Figure 46 above for Cawsey Colliery.

Figure 48 Account of wayleaves, staith rents and water courses chargeable annually of Sir Henry Liddell and George Liddell share of partnership collieries above bridge on south side of Tyne 1734 [72]

Mr Shaftoe	£ 20 ------
Mr Clavering of Cawsey	166. 13. 4
Mr Hardings	100 ------
Sir Francis Clavering	166. 13. 4
Mr Davisons	33. 6. 8
	£486. 13. 4
On 2,000 tens is called	£ --- 5---
Wayleave through Whickham Manor	--- 5---
	£ ---10---

This emphasis on unit cost is perhaps not surprising, bearing in mind that mine rents were traditionally based on so much per ten (*tentale*), such as the subcontracting agreement with Dunn and Davison, in which they agreed to work two of the estate pits at North Banks in 1725 in exchange for 35s per ten of coal led (q.v. p. 91). In 1737 the Grand Allies used unit cost calculations to determine how much per ten they were willing to pay the subcontractors at Beamish South Moor and Lanchester Common collieries. [73] Similarly, an *ex ante* computation of the unit cost of working Virgin pit at Byker, which was prepared by the viewer Stephen Drydon on behalf of Richard Ridley, was appended to a subcontracting agreement, and formed the basis of the tentale payment of £2/10.[74] *Ex ante* unit cost/profit calculations were also included in

a report to the owner William Carr by the viewer Richard Peck on the prospects of leasing his colliery to Mr Donnison.[75]

In all but two cases in the Grand Allies' minute book these calculations of unit cost and profit were used in *ex ante* projections. This reflected the forward looking orientation of the partners, who required assurance about the profitability of new operations, and contradicts Parker's observation that early cost accounting was mainly a matter of *ex post* recording rather than *ex ante* planning.[76] Some of the computations were based on projected annual rather than total output, suggesting that the original estimates were periodically revised. At a meeting in December 1730, the decision was taken for Stella colliery to be carried on for another year, the partners having considered estimates of unit cost and profit based on projected annual output of 600 tens.[77] It seems to have been common practice to determine annual output in advance, and not just when the Regulation of the coal trade was holding. At a partnership meeting on 18 November 1730,[78] at a time when the Regulation had faltered,[79] it was noted that 'the viewers have made their report how the several collieries are to be wrought in the year 1731, which is as followeth ...' The numbers of tens to be worked were then specified for each of the various collieries.

In the two instances in the minute book where *ex post* costings were prepared, the actual quantities of coal mined rather than the actual production costs formed the basis of the computations. The first is a calculation of Henry Liddell's total profits for 1734, which is shown in Figure 49 below. This document attempted to quantify the annual profits of the proprietor's different colliery interests and to produce a total. Estimates of unit profit were incorporated into this *ex post* statement by multiplying them by the number of tens actually led from the mine during the year. The calculation of unit profit of £4/0/1.5 for Cawsey Colliery is the one shown previously in Figure 46. Unit profit was also used to quantify the profit derived from the sale of

Figure 49 A computation of the profits of Sir Henry Liddell's collieries for the Year 1734 [80]

Partnership Collieries

	Tens [ons]	Wag	Making out	Profit per ten		
Dawsons Tanfield ...						
Burdon Moor ...						
Davisons Tanfield ...						
Beamish ...						
Cawsey	41	19	19 4/10	4 -- 1 1/2	167. 14. 3	
Spearmans ...						
	1,579 . 19				6,136 ---- 3	
Resting at Redheugh [staith] at the end of year 1733 which are or will be vended in 1734. 3,527 chaldrons which at 19 4/10 to a ten is 181.12 [tens] at 19 4/10 at £3. 16. 5 1/2					694 ---- 7	
						6,830 ---- 10
Team ship coal						
899.13 [tens] at 21 at £5. 3. 11 1/2					4,675. 19. 12	
Resting at Team Staith at end of year 1733 which are or will be vended in 1734. 1,592 chaldrons which is 75.17 [tens] at 21 at £5. 3. 11 1/2					393. 17. 2	
					5,069. 17. 2	
[Salt] pan and glass house [coal] resting 31 December 1733					669. 12. 3	
						5,739. 9. 5
[Other income:]						
Mr Bowes rent for 1/24 Blackburn Colliery						49. 16 ---
Sir H Liddell's interest in Farnacre Colliery						200 -------
H Liddell's moiety of Heaton Colliery this year is 706.1 [tens] at 19 4/10 £2. 16. 6 1/4						1,995. 6. 3
						14,814. 12. 6
Deduct						
H Liddell annual sum out of Ravensworth Colliery					400 -------	
G. Liddell annual sum out of several collieries					2,000 -------	
Charge for contingencies on the trade					1137. 10. 8	
						3,537. 10. 8
						£11,277. 1. 10

NB The wetness of the season occasioned this year's vend to be short of the 4 former years in an average of 577 tens 9 wagons which would have added to the profit £2,426. 2. 4.

last year's closing stock. The comment at the foot of the page regarding the four previous years suggests regular annual reporting. The second example making use of historical information was a computation prepared on 6 November 1735 of the expense of working Heaton colliery.[81] Here the projected unit cost was revised in the light of the number of tens actually led. Water and contingency charges were shown as 13s 9d on the basis of 2,000 tens, and then adjusted to 15s 9d (13s 9d x 2,000/1729) 'as there was only 1,728 tens, 8 wagons vended in 1735'. The resulting unit profit figure then formed the basis of a projection of total annual profits after interest over the remaining term of the lease.

In reviewing Jones' work [82] on Welsh industry in the eighteenth century, Edwards noted the common use of cost estimates rather than detailed build-ups of the actual costs incurred in operations, which he surmised was probably due to:

> the absence of detailed record-keeping, and the lack of any conviction that the benefit obtained from such information would justify the work involved in its preparation. [83]

The Grand Allies' viewers too were concerned with estimating future costs, although this was not due to a lack of record-keeping about historical costs. General experience presumably formed the basis of the costings for new ventures where there was no track-record of historical costs, but for existing operations, historical data about the costs was available from the financial accounting records. The thesis has already commented on the detailed analysis of costs contained in some of the Bowes cash books, and the same was true for the Grand Allies. Their accounts and cash books analysed and grouped the expenses of particular collieries.[84]

The accuracy of the Grand Allies' projections of costs and profits depended on the economic conditions, and, in particular, on whether the major coal owners agreed to the Regulation. The awareness that costs and revenues would vary in different

markets was not unique, and was noted by Jones, for example, in relation to the Welsh copper industry at that time.[85] In a 'fighting trade' the selling price of coal in the north-east would be lower and the production and selling costs greater. The fitters, who transacted the sale of coal from the mine-owners to the ships' masters, would require a greater measure of coal for the same price. Wayleaves would be dearer, and the London coal dealers would be able to command a premium for accepting the coals. The minute book contains some sensitivity analysis, taking these factors into account. The negotiations with Lady Clavering in April 1727 for the partnership to lease Collierly, Barker's Closes and Tanfield West Field collieries at 30s per ten are an example.[86] Computations were produced which contrasted her profits under this arrangement favourably with the unit cost and profit if she worked the collieries herself in a fighting trade. The partnership's unit cost and profit were also calculated on the basis that it worked these collieries and paid her the 30s rent. In October 1727 the unit profit of working and leading Urpeth colliery was projected at £3/17 in a Regulation, and £3/2/10 without.[87] Profit calculations for 'contesting', 'fighting' and 'peaceable' trades were produced at the further negotiations in November 1727 with Lady Clavering, which also involved Richard Ridley.[88] Finally, the minute book contains a projection, dated October 1733, of the profits of Sir Henry and George Liddell's partnership collieries 'out of/in a regulation', in which the relative merits of both were quantified. For example, it noted a saving of a £2,635 premium to the London coal dealers if the Regulation held.[89]

The frequency with which the calculations of unit cost and unit profit appear in the minute book, together with their *ex ante* basis, indicates their importance in business decisions. It has already been noted that the minute book provides no evidence that costings were used by the Grand Allies in pricing decisions. This was in contrast to wagonway contractors who used unit cost information to price new wagonways. In 1722, for example, Albany Baker, a contractor, calculated the cost per yard at 4s 8d, which formed the basis of a £400 bill for laying 1,600 yards of rail at 5s

a yard.[90] In the majority of cases, the decision under consideration by the Grand Allies seems to have been whether to continue working a particular colliery. Similarly, costings were prepared to indicate whether a new working was viable, which entailed the subsidiary decision of the best means of gaining access to the coal. In 1732, for example, the viewers John Barnes and John Bullock set out two alternative means of gaining access to coal at the east end of Killingworth Moor, and concluded which would be the least costly.[91] Unfortunately, the cost calculations are not included in the report. Another instance relates to Birtley Fell colliery which lay mid way between the Tyne and Wear. A decision was needed about which port to send the coal to. Consequently, the differential costs and revenues of transporting coal to both rivers were calculated, with a difference of £1/6/2 profit per ten in favour of the Tyne.[92]

The final decision identified was whether to persist with the Regulation. In this connection, one of the most unusual planning schedules relates to a partnership scheme in 1738 to break the power of the London lightermen, and ultimately to take over the whole of their trade. The premium charged by the lightermen in a 'fighting trade' was a persistent bone of contention with the Newcastle coal owners (q.v. p. 115), and a major incentive for preserving the Regulation. The Grand Allies were reluctant to pay, and in 1737 they received the following ultimatum:

> Message from ye lightermen delivered to George Bowes Esq by Mr James Horton.
>
> June 18 1737 The lightermen desired to deliver the following message to your honour or his partnership.
>
> That is to say if there is not order given for payment by the first Wednesday in July, is which is their Grand Assembly day of their whole body - meeting - they are determined to ask for the money after that day - but will then consider what measures to take to secure themselves for time to come is the resolution of them. [93]

One solution - although it was not adopted - was for the partnership to cut out the lightermen altogether by buying fifty lighters and dealing with its own lighterage. The ending of the lightermen's monopoly by the City of London in 1730 made such a scheme possible.[94] A planning schedule was produced in 1737, showing the capital that would be required and how it would be funded. Most of the funds would come from defaulting on the outstanding premiums for 1736 and 1737. Although there are some inconsistencies in the document - it omitted the savings relating to the 1738 premium but included them for 1739 - like the Bowes lead projection discussed on page 150, it showed an understanding of the relevance of *incremental* (additional) costs in decision making. £23,000 would be needed initially - £3,000 for the lighters and an additional £20,000 working capital. However, the amount that was relevant to the decision about whether to proceed was identified as £8,600 only (23,000-14,400); because the partnership would be obliged to pay £14,400 in respect of the outstanding premiums for 1736 and 1737 even if it decided not to go ahead.[95]

There is in fact more evidence of financial planning in the coal mines of the Grand Allies than in those of the Bowes estates. In particular, there is a noticeable absence in the estate collieries of the unit cost/profit calculations that were favoured by the Grand Allies. The lack of this type of planning schedule in the estate papers is perhaps a reflection of the lower level of capital investment involved in shallow mining at Gibside (q.v. p. 140). The corollary of this is that the concentration of unit cost/profit statements in the Grand Allies' records could be explained by the higher amounts of capital which they invested. Although each of the Grand Allies were major coal-owners in their own right, the extent of the resources which they commanded as a combination was much greater, enabling them to invest on a larger scale.[96] The forty-two miles of the Grand Allies wagonways alone in 1739 were said to have involved a capital outlay of £50,000.[97] £21,000 was expended in acquiring Whickham Manor in 1738.[98] If the level of investment was higher, so were the potential losses should collieries fail. Authors are agreed on the high risks of coal

mining in this early period, which necessitated the involvement of professional viewers to reduce the risks of failure.[99] The effectiveness of the viewers' forecasts is a separate question, but it seems reasonable that the scale of the Grand Allies' operations encouraged their use. It is presently unclear whether a general connection exists between the size and complexity of enterprises in the Industrial Revolution and the sophistication of their management accounting systems,[100] but the evidence in respect of the Grand Allies would tend to support such an hypothesis.

Notwithstanding the relative lack of projections for the coal mines at Gibside, those that are to be found exhibit similar features to those contained in the Grand Allies' minute book, suggesting the two are connected. Examples include a survey made by Anthony Leaton of the coal remaining in the Letch and Barn pits at North Banks in 1725, which converted the thickness of coal (measured in yards) left in the supporting pillars into tens,[101] thereby providing an output figure that could be used to calculate unit cost. An occasion where unit cost was calculated occurred in 1749; the cost per ten was computed at five of the North Banks pits in respect of a fortnight's workings, and then extended by the quantity worked in the year to give a total cost. The calculation for Quarry pit is reproduced in Figure 50. Similarly, the cost per ten

Figure 50 Charge of working North Banks Pits 1749 [102]

Quarry Pit 13 tens underground charges	£22 -- 10 -- 11
Light underground galloways [8 pit ponies]. 2 weeks oats at 3 bushels each is 24 bushels at 18d	1 -- 16 -----
Ditto hay at 28 stone each 2 weeks 224 stone at 2d	1 -- 17 -- 4
4 gin horses 2 weeks oats at 6 bushels each	1 -- 16 -----
Ditto hay at 28 stone each 112 stone at 2d	---- 18 -- 8
	28 -- 18 -- 11
[Divided by 13] is £2, 4s, 6d per ten	

was calculated at various of the North Banks pits for the fortnights ending 17 August, 12 September and 22 December 1753.[103] These instances are particularly interesting in view of the previous comments made regarding the scarcity of *ex post* information in the Grand Allies' minute book, because they seem to have used the *ex post* costs of a fortnight's workings (a fortnight was the subcontractors' normal period of account). However, the shortage of this type of report in the estate records prevents us from forming a general conclusion.

Ridleys

The profit motive of the Ridley family is evidenced by their willingness to deal in shares of estates, rather than whole undertakings, in the same manner as they treated their commercial operations. In 1719, for example, Matthew White assigned two eighths of Gosforth colliery to Thomas Ord and three eighths to Richard Ridley.[104] In 1781 Sir Matthew White Ridley had shares of sixteen twenty-fourths and eight twenty-fourths in two glassworks.[105] A valuation in 1776 shows that Matthew Ridley similarly owned one eighth of the Winlaton Lordship in partnership with John Simpson,[106] and the thesis has already referred to his shareholding in the North and South Blyth companies, which owned estates in the Blyth region (q.v. p. 103). Finally, Matthew White and Nicholas Ridley purchased the forfeited estate of the late Earl of Derwentwater at Plessey and Newsham in partnership in 1723.[107] These acquisitions differed in nature from George Bowes' purchase of the Hollinside estate in 1735. Although there was a commercial motive - the avoidance of wayleaves - a letter from George Bowes to his mother-in-law, Mrs Verney, shows that he also had its aesthetic qualities in mind. Hollinside bordered on the north-east fringe of Gibside, and its acquisition allowed Bowes to enhance the aspect of his property by constructing of a new coach way. The letter advised:

> I have this day purchased at the expense of £10,000 my neighbour Harding's estate, which I have long wished for, as it will not only greatly enlarge my possession at this retired place, but it will give me room to make new beauties by its happy situation ...[108]

However, George Bowes started from a stronger landed base than the Ridleys, and possessed greater resources. Buying estates in partnership, and paying for them in instalments (q.v. p. 118), suggests that the Ridleys experienced difficulties in raising the substantial sums of capital required - £16, 000 for Plessey and Newsham and £13,550 for Cramlington, for example. Arguably, they could not have afforded to buy properties which did not pay, and their acquisitions in Northumberland enabled them to build up a coal mining monopoly in the Blyth region incorporating a suitable port for shipping their coal, and away from the interference of the other Tyne coal-owners. No wonder they were relieved in 1730 when the indebtedness of the North Blyth company was cleared, thereby preventing its properties from falling into the hands of their rivals on the Tyne, the Liddell and Cotesworth families (q.v. p. 104).

From a planning perspective, accounting information was made available to prospective purchasers, concerning an estate's rental value and future commercial prospects. The advertisement in the London Gazette for the sale of the Cramlington estate in 1754, for example, listed the tenants, acreage and annual rents, and contained a note that 'the above estate is very improveable and well stocked with coal'.[109] The same type of information was provided in respect of the forfeited estates of the late Earl of Derwentwater, who had been executed for treason following the unsuccessful Jacobite rebellion of 1715.[110] Rental values were particularly important, as there was an accepted formula for valuing estates based on annual rents at so many years' purchase. In the case of the 1776 valuation of Matthew Ridley's interest in the Winlaton Lordship, the number of years' purchase varied from twenty to thirty-three, dependant on the type of property being let.[111]

Probably the best surviving planning data for the Ridleys relates to the use of steam pumps, on which their coal mining operations to the east of Newcastle depended (q.v. p. 36). Raistrick explained:

> With the extension of the work from outcrop opencut to small bell-pits and then shaft workings further from the outcrop, and an attempt to win the seams below the High Main, considerable troubles with water were met, and these rapidly increased to a climax about 1745, when for a time the collieries were flooded or 'drowned out' ... The trouble arose from the situation of all these collieries on the edge of the Tyne basin and the fact that most of their early workings had been on the 'rise' that is the high side of the coal ... The earliest collieries to work the Main coal extensively, were Jesmond, Heaton, and to less degree, Byker. There was a fairly steady dip E. or S.E. from Jesmond, into Heaton, and then to Byker. The result was that the water accumulating in the goafs of Jesmond and Heaton was a dead weight on the barriers of Byker Colliery, and there was constant fear of inundation, only too frequently materialised. [112]

Information was needed in 1745, as the water was rising, concerning the incremental costs and revenues of steam-pumping in order decide whether to continue with the pumping operation. This was supplied in a series of viewers' reports. First, the operating costs of two pumps at Jesmond were estimated at £15 per week.[113] This figure was then incorporated into a computation by Richard Peck, the resident viewer, of 'what coals may be wrought out of Jesmond colliery by the undermentioned pits in the time before they are drowned'. Taking into account the drawing power of the engines and the rate at which the water was rising, he estimated that the operations could be continued for a maximum of eleven weeks with the engines, or nine weeks without. Using the engines, therefore, would produce extra output of eighty tens, compared to the extra costs of £165 (11 x £15).[114] Peck's figures were vetted by George Bowes' chief-steward, William Leaton, in his capacity as an independent viewer, and by Nicholas Walton. They agreed that eighty tens constituted the maximum loss of output through curtailing pumping. This was the best course of action, particularly in view of the approaching wet season, which might increase the expense and reduce the output beyond Peck's estimates.[115]

There is no confusion in the minds of the viewers between revenue and capital expenditure in these reports, between the ongoing expenses and the costs of acquiring new assets. The above situation involved revenue costs only, in contrast to a projection the following year of the capital cost of reopening Byker colliery. The scheme involved installing five new engines at £1,200 each, and sinking the necessary engine shafts. Two engines would be needed immediately to hold back the water to allow the sinking operation to continue, and a further three to enable coal to be extracted. The total capital outlay was estimated at £9,550, and properly included the operating costs of the steam pumps during sinking.[116]

A letter in 1780 concerning a proposal by Sir Matthew White Ridley and Joshua Henzell to distribute their bottles in London displays the same ability to identify the costs relevant to a decision:

Letter from	Jos Goodchild Adam Dennis Jake Young London Dec. 1780	to	Mr Joshua Henzell at the Glass Houses Newcastle upon Tyne

> At our monthly meeting on Monday last, your proposition from Sir Matthew White Ridley in regard to the Bottle Trade was taken into consideration, but the company in general do not seem very fond in these bad times of entering into a new line of business unless as agents to Sir Matthew ...
>
> But in order to put the scheme into practice a warehouse must be hired, a horse must be purchased and likewise a waggon upon springs to carry out the bottles, measures for sorting straw for packing ... Likewise the warehouse must be fitted up with proper racks ... [the cost of setting up the operation was estimated at £100]
>
> ... Then in regard to the annual expense there will be freight and lightering of which we cannot judge unless we knew the quantity.

But there will be a certain expense annually for rent and taxes at	£40. 0. 0
Keep for a horse, shoeing & c at	30. 0. 0
Wages for two porters hand, house & stowing, pack and send out bottles	60. 0. 0
A clerk to superintend take orders and deliver the goods under our direction	50. 0. 0
Sundry little expenses which does not at present occur, but may be found necessary suppose about	20. 0. 0
Per annum at	£200. 0. 0

> Now bottles are sold in London at 36 shillings but as one must push for trade I should suppose we must sell for something less say 34 per gross, and from the above rough sketch Sir Matthew will judge whether the profits will answer the expense and leave something for the trouble of his agents which we would leave to be settled as the business may prove. [117]

It is unclear who Messrs Goodchild, Dennis and Young were, although it seems likely they were a firm of merchants. There is the suggestion that they had been invited to undertake the venture in partnership, but preferred to act as agents and receive commission. As well as identifying the relevant costs and revenues, which Pollard said were often confused, [118] the letter also contradicts his observation that the interest partners received on their capital as part of their profit-share was usually treated as a cost 'in computing the advisability of planned ventures'.[119] From this he imputed a lack of profit motive in that interest rather than profit was commonly regarded by contemporaries as the legitimate reward for capital. However, the writers made no mention of interest on proprietors' capital. For them, profit, as comprising the simple surplus of income over expenses, was the sole motive for undertaking such a venture.

Finally, a number of viewers' reports were compiled in 1787, appraising the relative advantages of alternative routes for a new wagonway from Plessey colliery to the port of Blyth. Although these are strictly outside our period, they are reminiscent of Charles Montagu's earlier projections for the Dunston Way (q.v. pp. 143-4). The problem was that the existing wagonway passed through the lands of the Delavels, who seem to have been threatening to deny the Ridleys a wayleave. There were at least three other possible routes of varying lengths, involving different wayleaves. The viewers' projections clearly differentiated between the capital costs of construction and the annual operating expenses. The first took into account a reduction in respect of rails and sleepers that could be salvaged from the old wagonway, and the second, interest on the construction costs at five percent.[120]

It follows that there are strong similarities between the management accounting records of the Ridleys, Bowes and Grand Allies. It is the emphasis on planning as a basis for decision making, in particular, that confirms that the Ridley family, like the Bowes and Grand Allies, sought to maximise profits, aided by the use of accounts. The similarities in their records are not surprising given that they all made use of viewers, some of whom were the same; and the tendency for viewers to work in association with each other, and to undertake commissions for different proprietors, increases the likelihood that these practices were typical of other estates in the region.

Exercising power

Foucault identified the growth of disciplinary power within society as the defining characteristic of the modern age.[121] This development occurred as disciplinary institutions such as prisons, hospitals, armies, schools, government and factories acquired the capability to control the lives of the individuals in their charge through surveillance techniques.[122] Accounting is significant to *Foucauldians* as one of the

prime methods of surveillance within organisations and society; it constitutes a specialised form of knowledge that is inextricably linked to the exercise of power:

> On the one hand, they [the management accounting systems] produce a knowledge which can be used to discipline individuals .... On the other hand, the system of accounting which produces the knowledge is itself a product of the operation of power.[123]

The key development in this process for industry was the imposition of performance standards on the workforce:

> 'Great manufacturing spaces' were created where production could be organised on a much more systematic basis than when conducted by outworkers, or in cramped and dark workshops. As part of the control of activity in such 'spaces' individual workers could be assigned positions arranged to facilitate their surveillance and the creation of records about their work. These records in turn could enable the comparison of workers and the detailed assessment of their use to the business.[124]

The efficiency of the workers could be evaluated either by comparing them against each other or against pre-set targets. It is argued that people, unlike machines, respond to such performance measures by internalising them into forms of self-control.[125] For authors such as Loft, Hoskin and Macve, accounting becomes a potent source of power over labour, eliciting efficiency gains and regularising relationships within the organisation, through this ability to articulate human performance.[126]

Foucault's views have been challenged by so-called *Neo-classical/Economic-rationalist* accounting historians who maintain that the social significance of accounting has been overplayed, and who look for economic motives to explain the development of modern practice. Authors such as Edwards, Boyns and Anderson explain it in terms of the pursuit of wealth through rational decision making, and argue that it was the British Industrial Revolution especially that first gave entrepreneurs the opportunity to act in this way.[127] For Edwards and Newell, the

historical development of management accounting was a relatively unproblematic response to the demands of economic development.[128] The explanation why performance measures were transferred from materials and machines to labour has become the main focus of disagreement between the two schools. The *Foucauldians* disagree that their introduction was 'a rational response to the needs of economic development'.[129] According to them, the preconditions for this change were social rather than economic. They had more to do with the spread of *grammatocentrism* (use of writing) and *calculability* (examination and grading) within American society in the first half of the nineteenth century, than the increased opportunities for making profits afforded by the British Industrial Revolution.

Chronology is an issue. The *Economic-rationalists* tend to stress the continuous nature of accounting development, in contrast to the *Foucauldians* who see it as more discontinuous. According to Hoskin and Macve, a clear dividing line exists between the modern and the pre-modern accounting worlds, with accounting first being used as disciplinary technology in a modern sense at Springfield Armory in the United States in the 1840s.[130] In Britain, the change may not have occurred until after the First World War, when scientific management systems were introduced from America.[131] However, the historical record is incomplete. Further research is needed to identify any instances where labour performance standards did feature in the British Industrial Revolution:

> This knowledge would render futile the Foucauldian attempts to identify the preconditions for such a development as lying elsewhere, primarily in non-economic settings of the kind located by Hoskin and Macve in the US in the early nineteenth century. On the other hand, if the crucial development dates from the early nineteenth century US, the traditional Neoclassical view of accounting's historical development as a 'demand response' to the forces of economic development would be rendered problematic, for the major achievements of the Industrial Revolution originated in the UK at a time when the US was still an economic backwater.[132]

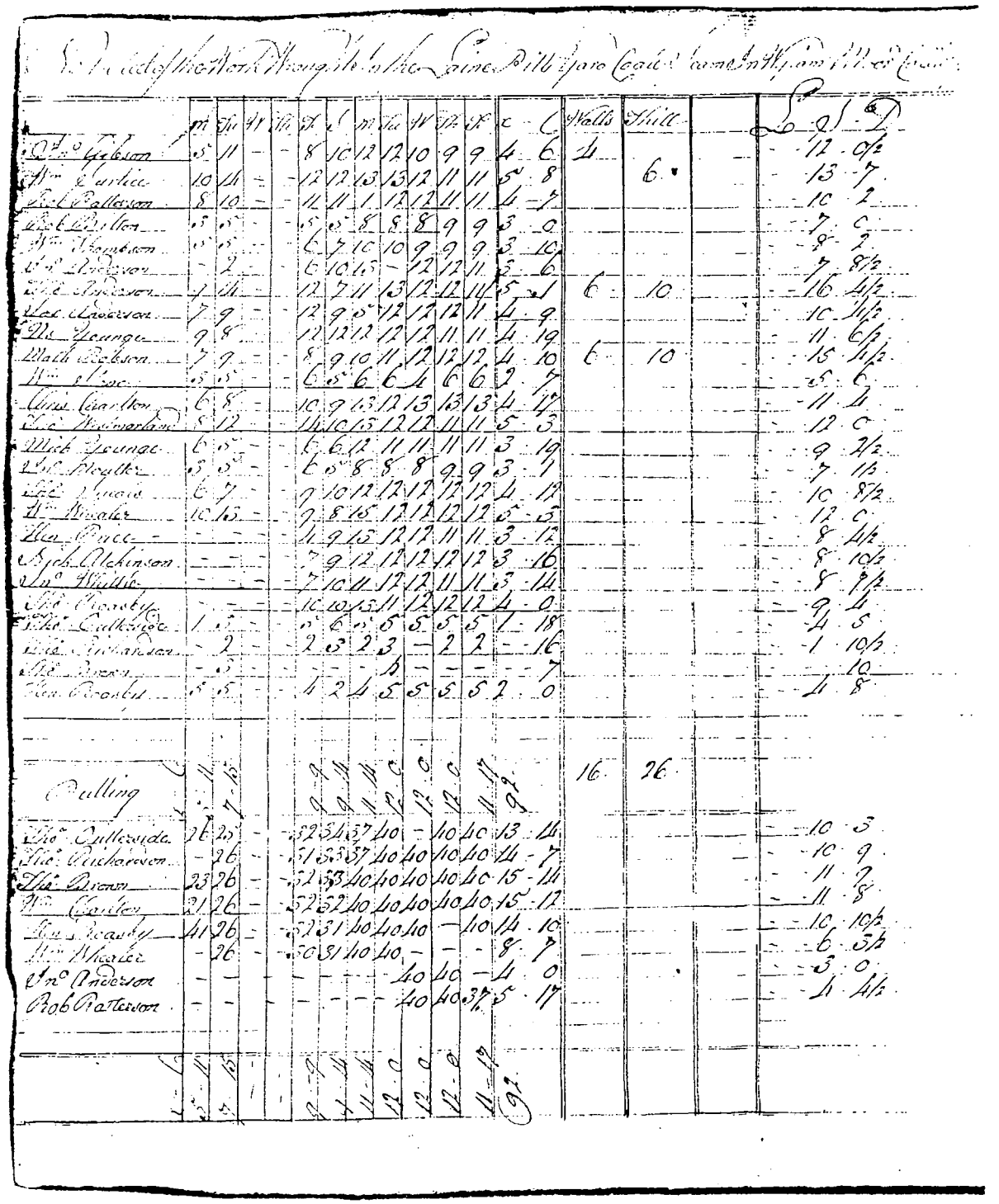
Is there any evidence of a *Foucauldian* type knowledge-power relation in the Bowes estates? If this is interpreted to mean a system which imposed performance norms on the workforce, against which 'each individual's commitment and omissions were constantly evaluated',[133] the answer is no. This can be illustrated in relation to coal, which constituted the largest industrial source of labour in the region, and also the one with the most clearly defined control procedures. Here, Fleischman and Parker found a lack of attention to labour cost control, despite the relative sophistication of the costing records in the Tyneside coal industry compared to other regions or industries in Great Britain (1760-1850). They wrote that researchers seeking the origins of modern managerialism in accounting systems that establish discipline over labour would be disappointed in the Tyneside archives.[134]

The two main components of the system of labour control adopted by most Tyneside coal owners, including the Bowes, were paying miners on a piece-rate basis and tying them to a particular employer for a year by a pitman's bond. Nef maintained that the piece-rate system had become the norm on Tyneside for hewers and sinkers before the eighteenth century.[135] This is borne out by contemporaries. In 1708, J.C. Loudon wrote:

> It is clearly best to agree by the score and then good hand, good hire, as we say, and you pay for no more than you have wrought, or comes out of the pit.[136]

The Blackett (Wylam) collection probably contains the best surviving payroll records for an estate colliery operation in the north-east in the eighteenth and nineteenth centuries, including fortnightly paybills which run continuously from 1778 to 1869. These listed the hewers and putters (underground hauliers) by name, showed their daily output, and their total earnings for the fortnight. One of the earliest of these reports for January 1778 is reproduced in Figure 51. The hewers were paid at the rate of 2s a score, compared to the putters' 9d a score. The totals for both were

Figure 51 No 1 account of the work wrought in the Laine pitt yard coale seame in Wylam Moor colliery [137]



carried forward to a schedule which summarised the 'whole charge' of the fortnight's workings. There seems to have been very little change in the system, except that by the mid-nineteenth century the details were recorded on printed forms. As far as the pitman's bond was concerned, the earliest known example in the region relates to the Benwell mine of Charles Montagu in 1703. By the 1760s such bonds were commonplace.[138] An example has survived for the Bowes estates, dated 23 December 1741, whereby thirty-seven miners agreed to serve George Bowes for a year as servants, workmen, hewers, barrowmen and horse drivers in return for a payment of 6d each and regular wages.[139] The penalty for absconding before the year was out could be as severe as a fine or imprisonment, although the latter seems to have been rarely applied in practice.[140]

Whilst the piece-rate records provided the necessary data for managers to evaluate individual performance, Fleischman and Parker found no evidence that they were used in this way. Some of the paybills did compare the fortnight's production to that of the previous period, but it was done 'on an aggregated, rather than an individual basis'.[141] The accounting system was lacking from a *Foucauldian* point of view, therefore, because it did not establish disciplinary control over individual workers in a modern sense. However, the significance of this omission is unclear. Would efficiency gains necessarily have resulted from imposing performance standards on labour, compared to the adopted system of paying miners on a piece-rate basis, and tying them to particular employers through legal constraints, such as the miner's bond? Arguably the system could not have been bettered. The piece-rate method gave the miners the incentive to produce more without alienating them through unnecessary management interference. One of the difficulties that owners faced in a period of escalating production - according to Flinn and Stoker it increased ten-fold between 1700 and 1830 - was labour shortage, and experienced miners being 'poached' by other owners after their year was out:

> Poaching was achieved by bribes of various kinds. In the North-east the level of fees, or 'binding money', offered at the time of the annual bindings, were an obvious method. John Bryers, the Delaval's agent in the early nineteenth century, advised in 1803 that binding money would have to be increased because a great many miners had left.[142]

Harris observed that

> a skilled coal-face worker was a very valuable man; in good times his pay was high though, as in a number of trades, peak earnings were achieved for only part of his working life, since a close combination of skill and strength was required. Good men were able to get more sizeable, saleable coal by skilful under-and side-cutting, sometimes avoiding the waste of slack and dust by cunning wedging and use of natural roof pressures to break up the coal.[143]

The 'rapid increase' in the coal trade had produced such a scarcity of skilled pitmen by 1764 that some mine-owners were offering binding money of two to four guineas in place of the customary shilling.[144] The owners responded to this situation by agreeing not to hire colliers unless they could produce a certificate of release from their last employer. By striking successfully in the following year in response to this move by the owners to reduce their freedom of employment,[145] the miners demonstrated their support for the traditional system, which, in a situation where skilled labour was scarce, restricted the ability of the owners to 'discipline' the workers any further, because it allowed them to walk away to another employer after their year was out.

It could therefore be argued that the economic circumstances of the time rendered it inappropriate to use accounting as a disciplinary technology over labour in a *Foucauldian* sense, thereby lending support to the *Economic-rationalists*. However, the absence of performance standards over labour does not mean that accounting knowledge could not function as a power mechanism in other areas of the Bowes estates' organisation. This might even be expected from a *Foucauldian* perspective. As we have seen, accounting permeated every aspect of the estates' operations,

suggesting a high degree of *grammatocentrism* (use of writing) and *calculability* (examination and grading), which Hoskin and Macve identify as the main dynamics driving the *Foucauldian* 'power-knowledge interaction'.[146] Indeed, the lack of performance standards despite the presence of these dynamics suggests that the relationship between the two may have been overplayed. Is there any evidence of the interaction of knowledge and power in the accounts?

First, the ubiquity of accounting suggests that it enjoyed a high status within the Bowes estates, which is confirmed by its common use in arbitration. The thesis has already referred to keeping bargain books in lead mining in order to resolve disputes between the proprietor and subcontractors (q.v. p. 111). George Bowes' heads of proposal for reconciling differences between himself and the other Grand Allies in 1736 included the drawing up of accounts.[147] An internal memorandum at Gibside in 1725 shows an appreciation of accounting's potential for gaining an advantage over the other party in a bargaining situation. The point at issue was the fixing of the London lightermen's premium, which was a matter of negotiation between the coal owner and the lightermen. The memorandum began:

> NB The accounts of fitters' reports sent Mr Bowes ought not to be exposed neither to crimps [a type of selling agent at London] nor lightermen but purely for his own information and guide on setting ye premium with them.[148]

The owner was in a position of superior knowledge because he had access to detailed information about the Newcastle end of the coal market from the fitters' accounts (q.v. pp. 105-7), and it was important to ensure they did not fall into the wrong hands.

The importance of accounting as a bargaining tool is also evident in the Ridley papers. For example, accounting, or the lack of it, played an important role in the dispute between the Ridleys and Nicholas Wescombe regarding the repayment of the latter's £3,000, which the courts settled in his favour (q.v. p. 104). Sir Matthew

White Ridley wrote to John Lawson, the agent for the North Blyth company, asking him whether he knew anything about the mortgage, as he was 'apt to think that it was paid off some thirty years ago, as no notice is ever taken of it, nor mention made about it'.[149] His lack of knowledge contrasted with that of Wescombe, whom he described as 'a man so close in his accounting, that I doubt not but he will take the advantage of every circumstance'.[150] The correspondence shows that Wescombe used his knowledge of accounting to successfully promote his interests. For instance, in April 1780 he sent Ridley a 'calculation about that half year [to Martinmas 1776] in which he does not seem to have injured himself by abstracting the account'. The abstract made 'additions' to Lawson's accounts in respect of Wescombe's share of rents received and mortgage interest due.[151]

Second, the quality of the accounts was itself an issue; the better the accounts, the greater the credit reflecting on the person who had prepared them. This is illustrated by correspondence in 1758-60 between Richard Stephenson, one of the chief stewards at Gibside, and John Gibson, the manager of the lead smelting mill at Wemmergill.[152] The bone of contention was John Gibson's salary of £10 per annum, which he said was insufficient to supply him 'with the necessaries of life'. He threatened to resign unless the salary were increased to £20, which was the sum paid to Nathan Horne, the manager of the lead mines there. Richard Stephenson rejected his request, countering that he had heard that John Gibson was not giving 'due attendance at the mill'. John Gibson's first line of defence was the quality of his accounts. Suspecting Nathan Horne as the informer he wrote:

> ... would [he] but look at home; he would have no reason to accuse me. He gets a great part of his accounts made up from the work people's memoranda, hence he has nothing to rely on, but their word. I write down daily what is transacted at the mill and I keep such accounts as I know in my own knowledge to be right.

The fact that he kept a daily record proved his attendance, in contrast to Nathan Horne, who was content to rely on the presentments of third parties.

Finally, the performance of stewards could be judged from the accounts. John Gibson sought to demonstrate his own accounting expertise, and Nathan Horne's inefficiency, by quantifying the losses that had resulted from Horne's mismanagement. Going back over the recent figures of price and output, he prepared detailed schedules of the profit that had been forgone by working the mines instead of letting them. Further schedules quantified the loss of revenue caused by Nathan Horne's dismissal of the *hushers* at Birkdale. Hushers used the water pressure built up by damming a stream either to prospect for new ore, by clearing away the surface soil and rock, or to extract worked ore from the mine wastes.[153] According to Gibson, the total profit that had been forgone since the the hushers had been discharged four years previously amounted to £807/10/7.[154] The high status of accounting within the organisation meant that it could be used to promote the interests of individuals. In this particular case, although John Gibson did not get his salary increase, Nathan Horne was dismissed for bad management. Accounts had been used to 'articulate' his performance, and he had been disciplined as a direct result.

To sum up, it is argued that the *Economic-rationalist* and *Foucauldian* dichotomy is too simplistic. In reality, there may have been several reasons for preparing accounts, which varied from situation to situation. The correspondence between Gibson and Stephenson is a case in point. On the one hand, it demonstrated Gibson's understanding of differential costs and revenues, and how one could use this information to determine the optimal course of action - Fleischman and Parker cited the letters as an example of rational economic analysis,[155] and so they were - whereas, on the other hand, Gibson's prime motive was to promote his own interests in the estates at the expense of his rival. The previous section of the thesis highlighted cases where economic decisions were based on planning data. The same system also

generated information for controlling the operation of contracts, evaluating past performance, controlling costs and exercising power, all of which are characteristic of the modern organisation. These findings cast doubts on both the mutual exclusivity of particular explanations of accounting behaviour, and on the *Foucauldian* notion of a relevant distinction between 'pre-modern' and 'modern' business accounting, with the latter beginning in the mid-nineteenth century.

Notes

1 Fleischman & Parker, 1997: 29

2 DRO: D/ST/B1/2/126

3 DRO: D/ST/B1/20/38

4 DRO: D/ST/B2/105

5 DRO: D/ST/E5/1/1

6 DRO: D/ST/E5/1/4

7 DRO: D/ST/E5/1/2-8

8 DRO: D/ST/E1/2/2

9 Boyns et al, 1997

10 Edwards & Boyns, 1992

11 Fleischman & Parker, 1990

12 Fleischman & Parker, 1991

13 NRO: ZR1/36/1

14 DRO: D/ST/B1/2/125

15 ibid

16 Edwards, 1989: 80, 89

17 NUL: MSS/MISC/85/39

18 Edwards, 1989: 89

19 DRO: D/ST/B2/91/2

20 DRO: D/ST/B3/9/1

21 DRO: D/ST/B3/9/3

22 DRO: D/ST/B3/9/6

23 DRO: D/ST/B3/9/9

24 Beastall, 1975: 17-19

25 Ellis, 1976: 74-5

26 Flinn & Stoker, 1984: 314-17

27 Pollard, 1965: 211

28 DRO: D/ST/D5/1/151

29 DRO: D/ST/B1/2/154 & 156

30 DRO: D/ST/B1/2/33/5

31 DRO: D/ST/B1/6/174

32 DRO: D/ST/E5/14/42

33 Hatcher, 1993: 61

34 Levine & Wrightson, 1991: 10

35 JC, 1708

36 DRO: D/ST/B1/2/30

37 Atkinson, 1966: 9; Flinn & Stoker, 1984: 190

38 DRO: D/ST/B1/2/154

39 DRO: D/ST/B1/2/145

40 Malley, 1929: 98, 95-6

41 Raistrick, 1938: 136

42 NRO: ZR1/35/25

43 Hatcher, 1993: 266

44 ibid: 267

45 Bennett et al, 1990: 8

46 Hatcher, 1993: 463

47 ibid: 268

48 ibid

49 DRO: D/ST/B1/2/2

50 Levine & Wrightson, 1991: 61

51 ibid: 59, 61-3

52 ibid: 63

53 DRO: D/ST/B1/2/22

54 DRO: D/ST/B1/2/24

55 DRO: D/ST/B1/2/25

56 DRO: D/ST/C1/3/39/1

57 Scorgie, 1996

58 DRO: D/ST/E5/17/1/4

59 DRO: D/ST/B2/140

60 DRO: D/ST/C2/3/39/4-6

61 DRO: D/ST/B2/135/7

62 DRO: D/ST/B2/135/1-2

63 DRO: D/ST/B2/135/9

64 DRO: D/ST/B2/135/4, 11

65 DRO: D/ST/E5/18/3

66 Pollard, 1965: 248

67 Some of the material in this section is drawn from Oldroyd, 1996.

68 Ashton, 1961: 72

69 JC, 1708: 46

70 NRO: 3410, GA/2, part 1: 90

71 NRO: 3410, GA/2, part 1: 34

72 NRO: 3410, GA/2, part 1: 90

73 DRO: S/ST/B1/6/172

74 NRO: 3410, FOR 1/5: 8

75 NRO: 3410, PECK 1: 5

76 Parker, 1980

77 NRO: 3410, GA/2, part 1: 62

78 NRO: 3410, GA/2, part 1: 63

79 Cromar, 1978

80 NRO: 3410, GA/2, part 1: 93

81 NRO: 3410, GA/2, part 1: 99

82 Jones, 1985

83 Edwards, 1989

84 NRO: 3410, WAT 4/20; DRO: D/ST/B1/6/104

85 Jones, 1985: 21

86 NRO: 3410, GA/2, part 1: 10

87 NRO: 3410, GA/2, part 1: 25

88 NRO: 3410, GA/2, part 1: 26

89 NRO: 3410, GA/2, part 1: 74

90 DRO: D/ST/B1/19/10

91 NRO: 3410, GA/2, part 1: 89

92 DRO: D/ST/B1/6/186

93 DRO: D/ST/B1/66

94 Flinn & Stoker, 1984: 274

95 DRO: D/ST/B1/67

96 Cromar, 1978

97 Flinn & Stoker, 1984: 157

98 NRO: 3410, WAT 4/20

99 Ellis, 1976: 67-8; Flinn & Stoker, 1984: 49, 59-63

100 Fleischman & Parker, 1997: 290

101 DRO: D/ST/B1/2/22

102 DRO: D/ST/B1/2/28

103 DRO: D/ST/B1/2/29

104 NRO: ZR1/20

105 NRO: ZR1/36/1

106 NRO: ZR1/40/1

107 NRO: ZR1/18/8

108 Wills, 1995: 23

109 NRO: ZR1/13/4

110 NRO:ZR1/18/8

111 NRO: ZR1/40/1

112 Raistrick, 1938: 134

113 NRO: ZR1/35/22/72

114 NRO: ZR1/35/22/74

115 NRO: ZR1/35/22/75

116 NRO: ZR1/35/25

117 NRO: ZR1/36/1

118 Pollard, 1972: 134

119 ibid: 127-32

120 NRO: ZR1/35/15

121 Foucault, 1977

122 Loft, 1986

123 ibid: 140

124 ibid: 139

125 Fleischman & Parker, 1997: 194

126 Loft, 1986; Hoskin & Macve, 1988

127 Edwards et al, 1995

128 Edwards & Newell, 1994

129 Fleischman & Parker, 1997: 194

130 Hoskin & Macve, 1988

131 Edwards et al, 1995

132 Fleischman & Parker, 1997: 195

133 Hoskin & Macve, 1988: 41

134 Fleischman & Parker, 1997: 118

135 Nef, 1932b: 181

136 JC, 1708: 36

137 NRO: ZBK/A/1

138 Flinn & Stoker, 1984: 350, 352

139 DRO: D/ST/B1/2/12

140 Flinn & Stoker, 1984: 350

141 Fleischman & Parker, 1997: 118

142 Flinn & Stoker, 1984: 340-1

143 Harris, 1976: 171

144 Hammond & Hammond, 1919: 13

145 ibid: 12-17; Flinn & Stoker, 1984: 351

146 Hoskin & Macve, 1997:3

147 DRO: D/ST/B1/6/22/1

148 DRO: D/ST/B1/22/60

149 NRO: ZR1/39/12, letter dated 22.4.79

150 ibid, letter dated 9.5.80

151 ibid, letters dated 27.4.80 & 9.5.80

152 DRO: D/ST/C2/3/77/5-7, D/ST/B2/93/4

153 Hunt, 1970: 10-11; Turnbull, 1975: 15, 77; Fairburn, 1993: 160

154 DRO: D/ST/B2/93/4

155 Fleischman & Parker, 1997: 127

6

CONCLUSION

Through the accounts, the thesis has examined estate accounting and management practice on the Bowes estates (c.1700 to 1770), in order to ascertain whether they were managed efficiently as productive investments, and whether accounting aided managerial activity at this early stage of industrial development. The records of George Bowes' associated activity, the Grand Allies, together with those of the Ridley family have also been considered, in an attempt gauge whether the findings re the Bowes were typical of the region as a whole.

The dispersed locations of the various estates and associated activities meant that the proprietor could only control them at a distance, no matter how conscientious he was in visiting his properties. George Bowes was the estate proprietor for most of the period in question. He was an itinerant rather than absentee landowner, who travelled frequently between Gibside and London. His correspondence indicates that he took an active role in the management of the estates, although how vital he was to the day-to-day operations is questionable. Continuity in the tenure of stewards following ownership changes, as well as the continuance of procedures, implies that the estate business did not depend on the active involvement of the proprietor at an operational, as opposed to strategic, level. It was the stewards who determined management procedures, and they were also expected to make business decisions.

George Bowes' active involvement in the day-to day operations of his estates, coupled with the geographical spread of his activities and his distance from events, necessitated a centralised organisational structure, that was capable of delegating responsibility to stewards in key areas, whilst, at the same time, retaining control at the centre. This was achieved through a unified reporting network. Returns from all

the various activities and estates were ultimately channelled through the estate office at Gibside. William Leaton and Richard Stephenson, the chief stewards there, were able to determine what they expected to receive. This centralised system of organisation and reporting ensured that management and accounting practices were highly integrated over different activities. Another factor encouraging integration was the tendency to assign management responsibility by location rather than activity.

Generally, the Bowes accounts were based on the bilateral recording of cash receipts and payments, with adjustments for opening and closing debtors, creditors and stocks as appropriate. Physical stock checks, and stock reconciliations were carried out regularly, which is not surprising given the importance of mineral extraction to the estates. Double-entry accounting appears to have been the exception on the Bowes estates. The bilateral recording of cash transactions was probably preferred because it was simpler and more versatile. A variety of statements could be prepared from the cash books, in addition to the traditional charge and discharge accounts kept by all of the Bowes stewards. Charge and discharge accounts were not the most common type of report, owing to the complexity of the estates' business arrangements, and other types of accounts were needed to keep control of lessees, subcontractors and partners.

Most of the Bowes accounts were prepared by the stewards, and various sources of guidance were available to them. There were a number of contemporary printed guides, although none of them encompassed the full range of accounts used on the Bowes estates. Hand-written exemplars also existed, and stewards tended to follow the practice of their predecessors. Finally, a body of accounting expertise existed in the hands of colliery viewers. A general review of the viewers' records shows that estimating the output, costs and profitability of coal enterprise was a regular part of their work. Some of the Bowes' stewards came from a viewing background, such as William Leaton, the chief steward of the whole Bowes estate-

operation. A factor which emerges from the view-books is that, like the stewards, viewers worked in association with each other, and learnt their trade as apprentices. In this way the succession of knowledge based on practical experience was assured, reducing the need for printed textbooks.

The majority of the Bowes accounts are of a financial accounting type, because they were designed to keep track of rights and obligations. In this respect, the records are not dissimilar to those observed on other estates. The need to enforce rights and obligations meant there was a close linkage between the form of the accounts and the mode of organisational control. This is most clearly illustrated in relation to the Bowes' coal interests, where different methods of organisation were employed at different times, and the accounts responded accordingly. An important feature of the accounting procedures, therefore, is that they were flexible enough to respond to the organisational changes. Another, is that the contractual obligations of third parties were underpinned by written agreements. This legal underpinning of the business arrangements, combined with the use of accounts to monitor compliance, was typical of all the Bowes estates' business activities. Internal audit checks increased the effectiveness of the accounts as a control mechanism. The accounts of third parties were audited by estate stewards, who were themselves subject to audit by their superiors, which was common practice at the time.

The Ridley papers displayed many of the same facets. The letters of three generations of the family show that like the Bowes, they spent long periods in London, but maintained a continuous interest in business affairs, and corresponded regularly with their agents. There was continuity in procedures, and the accounts were versatile in dealing with different types of organisational control, including joint-stock companies, in which the Bowes had no involvement. Like the Bowes, accounts were used to enforce contractual obligations, and the same kind of audit procedures were employed.

Although these types of account successfully safeguarded the interests of the proprietor, and without them the estate operations could not have functioned, this does not prove either that the estates were managed efficiently as productive investments or that the accounts aided managerial activity, if *managerialism* is defined in terms of the rational pursuit of profits or exercising disciplinary power over labour. However, a range of other accounting data exists that was more managerial in orientation, and less concerned with tracking rights and obligations. The cost analysis in some of the cash books shows that the stewards were interested in tracking and monitoring expenses, and the survival of *ex post* profit statements for coal, lead and salt demonstrates an interest in the profitability of these activities. The criticism that such profit and loss accounts were flawed because they did not group together incomes with the appropriate expenditures does not apply to the Bowes, although it is less easy to refute the charge that they confused capital and revenue expenditure. The significance of the latter is lessened by the fact that industrial enterprise on the Bowes estates was not capital intensive. A wide range of planning data has also survived. Some of it quantified the future cash or capital requirements. Other documents appraised the future profitability of particular operations or investments, calculated the present value of future cash flows, or evaluated the outcomes of alternative courses of action. In contrast to the *ex post* profit statements, there was a clear distinction in these projections between capital and revenue expenditure. They also displayed an awareness of the need to obtain an adequate return on investment. These findings run contrary to the perceived inadequacies of Industrial Revolution accounting as an aid to managerial activity. The surviving cost analyses, profit statements and planning schedules show that profit maximisation was an important issue - the Bowes estates were not simply treated as units of consumption - and that the accounts played an important facilitating role.

The same was true of the Grand Allies and the Ridleys. It is the emphasis on planning as a basis for decision making, in particular, that confirms that these parties, like the Bowes, sought to maximise profits, aided by the use of accounts. All three sets of records display an understanding of the relevance of incremental costs in decision making, and the ability to identify the costs relevant to a decision. The similarities between the three are not surprising given that they all made use of viewers, some of whom were the same; and the tendency for viewers to work in association with each other, and to undertake commissions for different proprietors, increases the likelihood that these practices were typical of other estates in the region.

As far as labour control is concerned, there is little evidence of a *Foucauldian* type knowledge-power relation in the Bowes estates, in the sense of a system which established disciplinary control over individual workers through the imposition of performance standards. However, the significance of this omission is unclear, in a situation where skilled labour was scarce and not tied to particular employers on a long-term basis. These factors restricted the ability of the owners to discipline the work-force, rendering the *Foucauldian* connection inappropriate. However, the absence of performance standards over labour does not mean that accounting knowledge did not function as a power mechanism in other areas of the estate organisation, and there is some evidence of this. First, the ubiquity of accounting suggests that it enjoyed a high status within the Bowes estates, which is confirmed by its common use in arbitration. The high status of accounting within the organisation meant that it could be used to promote the interests of particular individuals. Second, the quality of the accounts was itself an issue; the better the accounts, the greater the credit reflecting on the person who had prepared them. Finally, the performance of stewards could be judged from the accounts, and there are instances where individuals were disciplined as a direct result. Such a situation might even have been expected from a *Foucauldian* perspective, given the high levels of *grammatocentrism* (use of writing) and *calculability* (examination and grading) within the estate operations; and

the lack of performance standards despite the presence of these dynamics suggests that the relationship between the two may have been overplayed. It is further argued that the *Economic-rationalist* and *Foucauldian* dichotomy is too simplistic. In reality, there may have been several reasons for preparing accounts, which varied from situation to situation. There were cases where economic decisions were based on planning data. The same system also generated information for controlling the operation of contracts, evaluating past performance, controlling costs and exercising power, all of which are characteristic of the modern organisation. These findings cast doubts on both the mutual exclusivity of particular explanations of accounting activities, and on the *Foucauldian* notion of a relevant distinction between 'pre-modern' and 'modern' business accounting, with the latter beginning in the mid-nineteenth century.

What are the implications for future research? By challenging the conventional view that estate management was essentially unproductive, and that accounting was an ineffective aid to management, the thesis affirms the need for more archival studies to build up as complete a picture as possible, at a time when the value of such work has been queried.[1] In particular, the question was posed whether it was more likely for estates to have been managed as profit-making investments in the north-east than elsewhere, given the business orientation of the local landowners. Comparative studies of the accounting procedures employed on other estates in the region would therefore be useful. The thesis attempted to assess the typicality of the Bowes estates by considering the records of other local landowners, but further collections such as the Matfen, Beaumont and Wylam branches of the Blackett family still await examination from an accounting perspective. One of the most interesting findings of the thesis is that the types of procedures implemented by the Bowes and Ridley families were essentially the same despite their contrasting social backgrounds. The Bowes were an established landed family in contrast to the Ridleys who were primarily part of the Newcastle merchant oligarchy. This suggests that estate practice

may have had a momentum of its own irrespective of the identity of the landowner. It would be particularly instructive, therefore, to examine the eighteenth century estate records of the Cotesworth family, in addition to those of the dukes of Northumberland. The Cotesworths were neither established landowners nor Newcastle merchants, and came from a humbler background than either the Bowes or Ridleys, whereas the land-holdings of the dukes of Northumberland were in a different class. In her reference to 'the almost complete absence of any of Cotesworth's account books or indeed of individual accounts which are not in draft or note form', Ellis understated the value of the Cotesworth accounts.[2] In actual fact, the Cotesworth and Ellison MSS contain large quantities of computations and accounts of a comparable nature to the type of material examined in the thesis.[3]

Second, the question remains about what happened after 1770. The Strathmore collection is unusual in the large volumes of business data that have survived over such a prolonged period, and the present study has merely scratched the surface. The estate and business records of the Bowes and Strathmores extend to the Second World War, and it would be interesting to trace how the systems identified in the thesis developed in response to technological, organisational and other changes. Sturgess, for example described how by 1830 the number of landowners engaged in coal mining in the region had shrunk to five - Londonderry, Durham, Ravensworth, Wharncliffe and Bowes - owing to the increasing size, complexity and expense of mining and the provision of transport.[4] Sill maintained there was a general tendency for landowners

> to retreat to a rentier relationship with the coal industry ... With the increasing depth of collieries and the expanding scales of production and employment, much greater capital resources were required; landowners became increasingly unwilling to risk large portions of their capital as costs rose and rates of profits tended to fall; a new class of viewers, managers and agents with technical, commercial and legal expertise took over the management of mines and the expense of employing such men probably deterred some smaller landowners;

> the class of experts frequently themselves became co-partners in colliery companies operating with coal leases negotiated from rentier landlords.[5]

The accounting records provide a means of appraising all of these factors, and it would be worthwhile replicating the present study for the period c.1770-1850.

Finally, there is the question of knowledge lost. The evidence in support of the view that accounting was a useful managerial aid during the British Industrial Revolution is becoming increasingly persuasive as more studies unfold. Equally persuasive, however, is the testimony of contemporary British accountants who saw the First World War as the catalyst for good management accounting practice, and acknowledged the scientific management debt to America in the post war reconstruction period.[6] Did these accountants really not know what was going on within business; had accounting knowledge been lost in the interim or had it failed to keep pace with economic changes, and therefore stood still? As with all these other issues, the only way forward is detailed archival research. If indeed accounting knowledge did decline in Britain in the course of the nineteenth century, the reasons why might help explain its earlier ascendancy.

Notes

1 Miller & Napier, 1993; Fleischman & Tyson, 1997

2 Ellis, 1976: preface

3 Cotesworth MSS: CK/1-14; CL/1; CM/2-3; CN/1-11
Ellison MSS: B1-15; C16; C20

4 Sturgess, 1978: 93

5 Sill, 1984: 149

6 Boyns et al, 1996: 203, 207, 251, 285, 288

APPENDIX 1

Glossary

ACCRUALS
: Reporting costs and revenues on the basis of when they arose, rather than when they were paid or received; i.e. adjusting the cash account for debtors, creditors and stock.

ADLINGS
: Wage for leading wagons.

BILATERAL
: Two-sided recording of receipts and payments.

BING
: The standard measure of lead ore produced, weighing 8 cwts.

CAPITAL EXPENDITURE
: The cost of purchasing or constructing assets that are held for the continuing benefit of the business.

CHALDRON
: A coal measure based on the dimensions of a coal wagon. A Newcastle chaldron weighed approximately 53 cwts.

CHARGE AND DISCHARGE
: The traditional method of estate accounting whereby stewards accounted for the discharge of their responsibilities.

CORVE
: A basket for transporting coal from underground.

COST OF CAPITAL
: The interest charges or other return demanded by the providers of finance.

DEAD-RENTS
: Rents for unworked collieries which had been acquired to prevent others working them.

DOUBLE-ENTRY
: Specialised form of bilateral accounting involving a ledger containing accounts for assets, liabilities, income, expenses and proprietor's capital.

EX ANTE
: Projecting future transactions.

EX POST

Retrospective recording of historical transactions.

FITTER

Shipping agent employed by the mine owners, who transacted the sale of coal from the owner to the ship's master.

GIN

Horse powered hoisting apparatus.

HEWER

A miner at the coal face.

HOSTMAN

A coal merchant.

HUSHING

A method of using water pressure to prospect for lead, or to obtain ore from the mine wastes.

LEADING (LED)

Transporting coal from the pit-head to the staith.

OVERMAN

Either a subcontractor or a salaried manager reporting to the viewer.

PAN COAL

Small coal unsuitable for domestic consumption that was used in salt-pans.

PIG

Bar of smelted lead.

PUTTING

Underground haulage of coal.

REVENUE EXPENDITURE

Expenses incurred in order to produce revenue.

SEA-SALE

Coal that was shipped to London.

STAITH

Construction for storing coal at the river side prior to it being rowed downstream to the river mouth in keels, where it was loaded into ships.

TEN

A coal measure, which was often used as a basis for fixing proportional mine rents ('tentale').

TIME VALUE OF MONEY

The concept that £1 received now is more valuable than £1 received later because it can be used to produce a return in the meantime.

VEND

Total annual sales by all the sea-sale collieries on the Tyne.

VIEWER

Mining consultant or chief mine manager.

WAGONWAY

Horse drawn railway for transporting coal from the pit-head to the staith.

WAIN

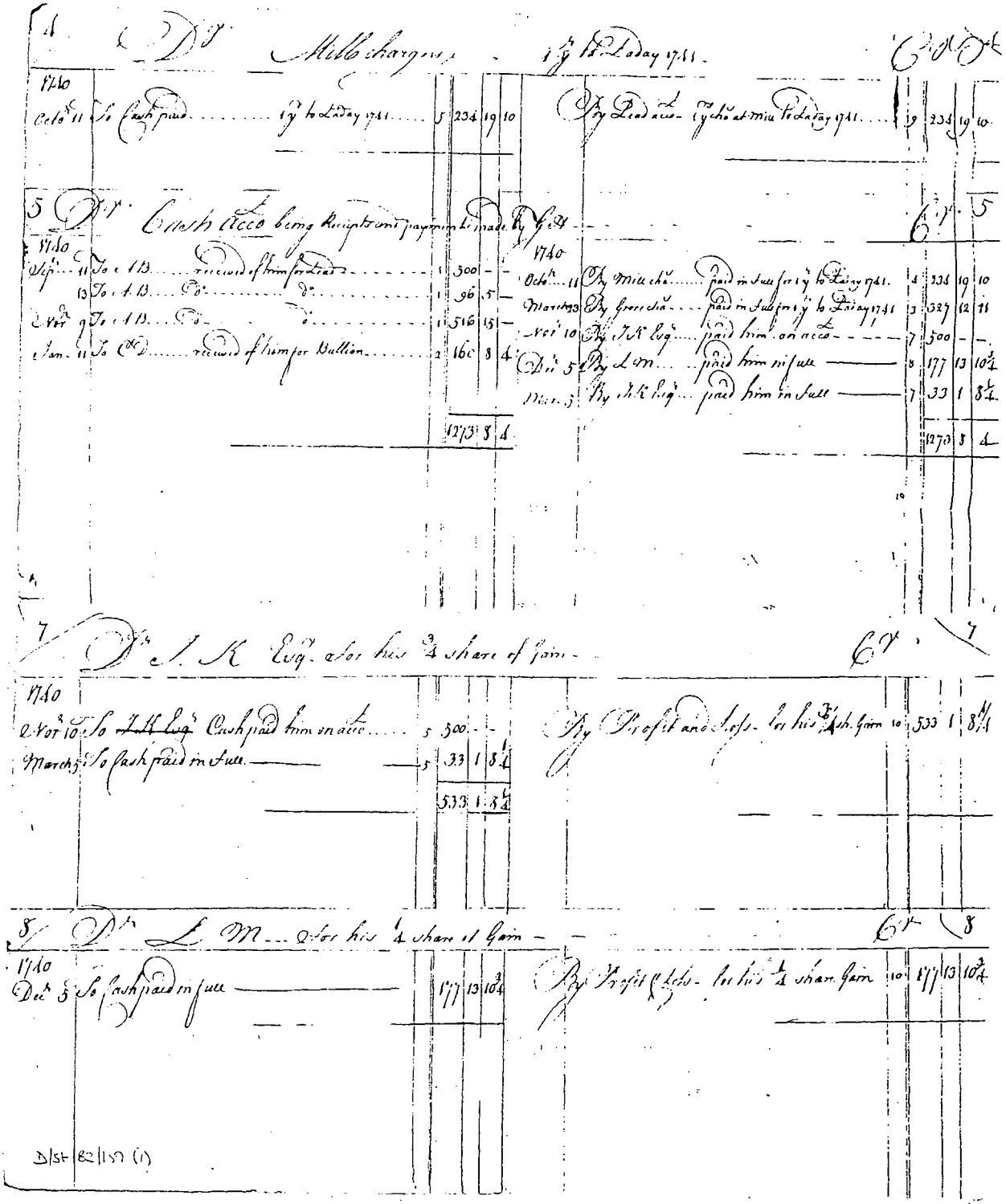
A cart drawn by horses and oxen for transporting coal overland.

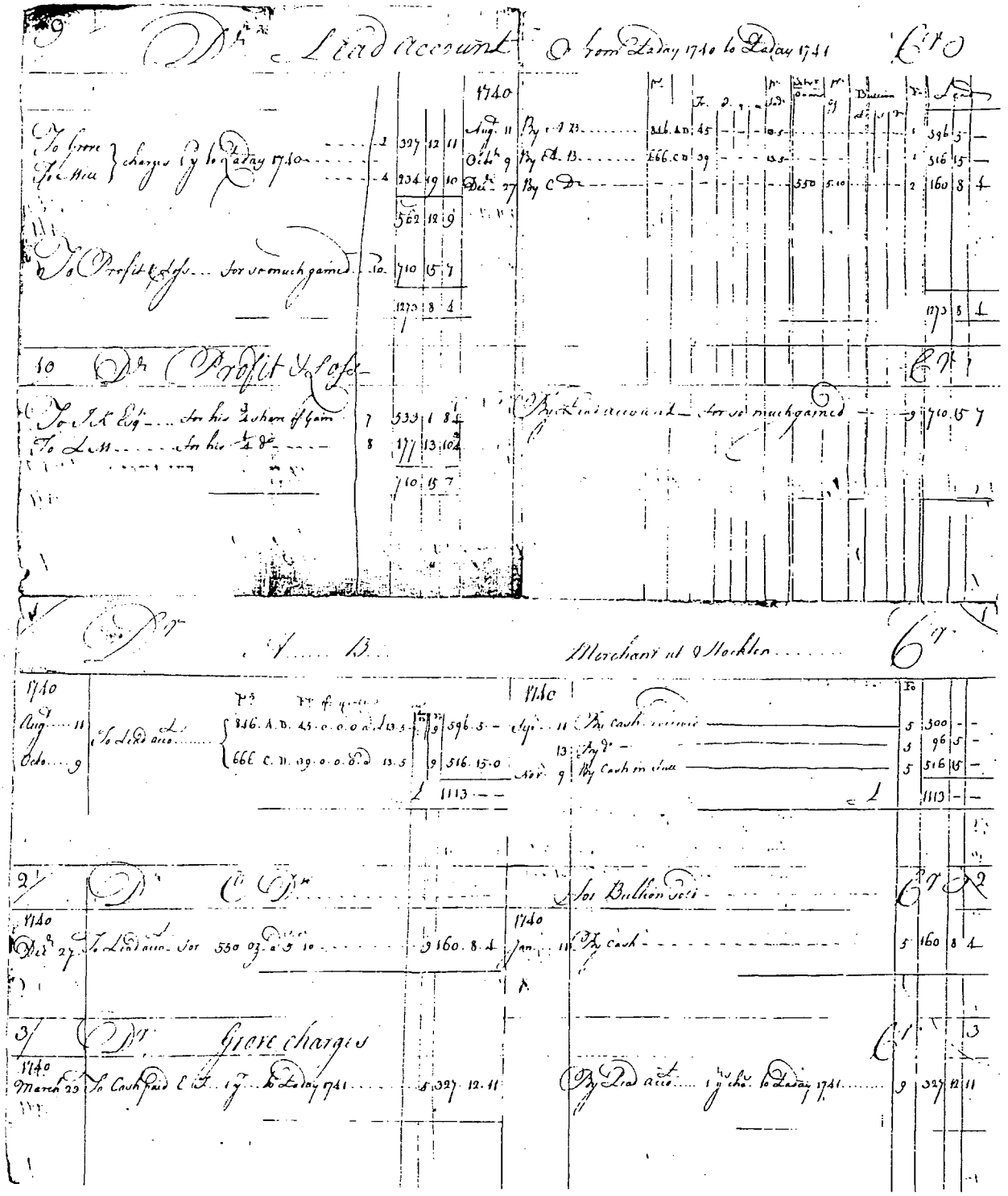
WAYLEAVE

Rent for allowing coal to be transported over a landowner's property.

APPENDIX 2

A good for nothing paper de[livered] to Streatlam as a curious precedent for keeping a smelt mill account





(Method)

Ladmill Acco from Laday 1740 to Laday 1741.

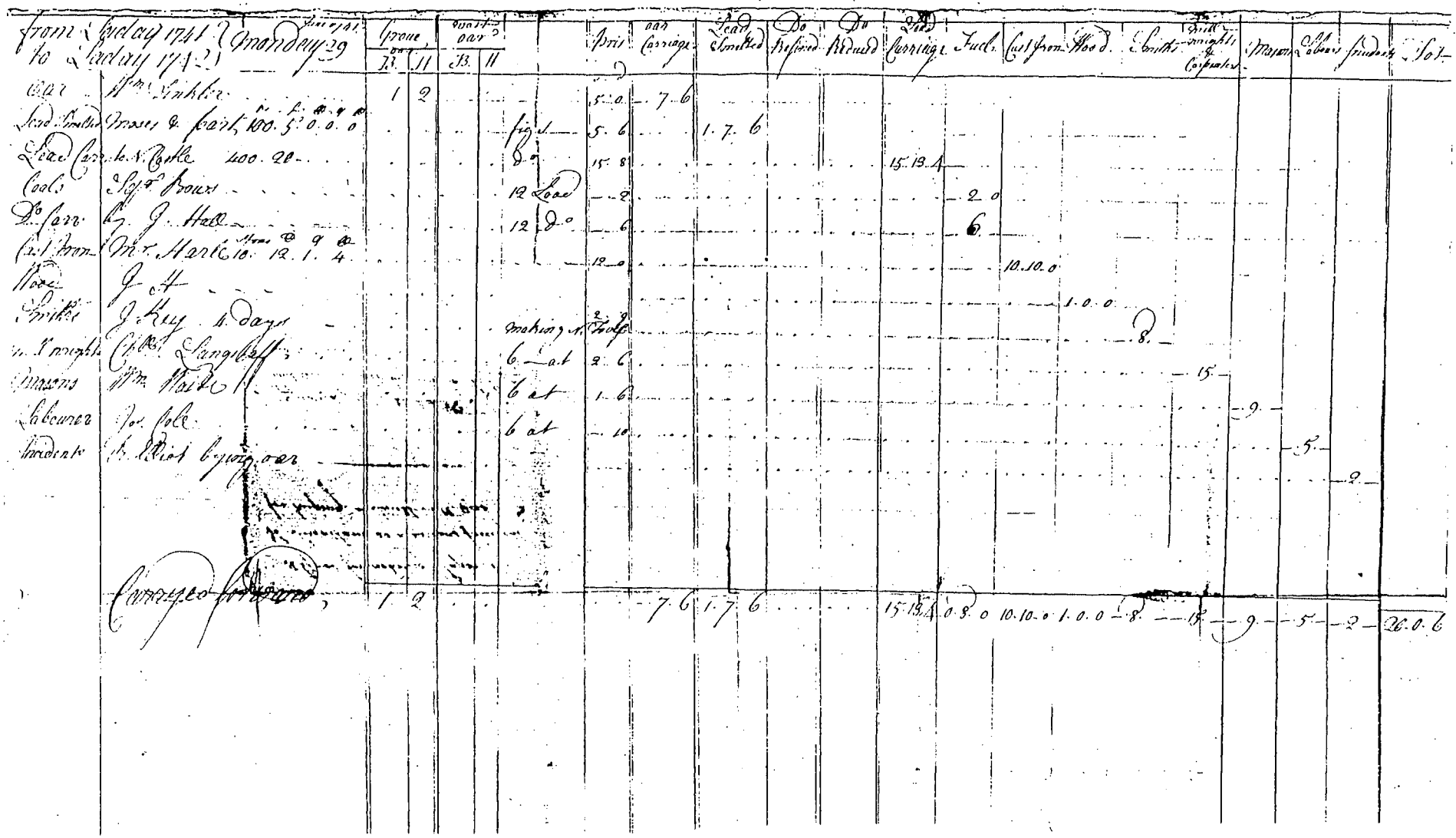
Charges at the Mine. – From Laday 1740 to Laday 1741.

	Sh			D. h.	p.				
	Cre	Turner	John	5 – ½	20		5. 2. 6		
	1	Robinson	Isaac	203. –	7		71. 1. 0		
Grove Oar		Gibson	Joseph	97. 3	9		43. 19. 9		
	2	Walton	Isaac	20. –	14		14. – –		
		Room Upartners		80. –	8		32. – –		
				405. 3½			166. 3. 3		
West Oar		Watson	Wm	16. –	18		14. 8. 0		
		Tot Oar		425. 3½				180	11 3
Sun. Vein		Allanson	Geo.	10 ←	12	p. doth	6. – –		
Cross. Cut		Harrison	Joseph	13	18		11. 14. 0		
Sun. streak		Watson	John	9½	16		7. 2. 6		
				32½				24	16 6
Wood. bought		Bayles	Symond	586	12	p. dozen	29. 6. 0		
Do. Hides		Hutchinson	peter	10½	8	p. Dozen	4. 4. 0		
Do. Hogsheads		Walton	John	1000	5	p. thousand	0. 5. 0		
Do.		Longmead	John	42000	5	p. thousand	10. 11. 0		
								44	6 –
Wood. cutting		Longmead	Edward	586	4	p. dozen	9. 15. 4		
Wood. carriage		Robinson	Wm	586	10	p.	24. 8. 4		
								34	3 5
Iron und. carr.		Wm	Sleigh	p. bill				3	– –
Ropes & carr.		Sissons	Wm	p. bill				4	– –
				Loads					
Coals & carr.		Forster	Wm	23	10				17 6
		Turner	Wm	143	12		7. 3. 0		
Days wages		Nicholson	Thomas	153	12		7. 13. 0		
		Ruston	Wm	142	12		7. 2 –		
		Dermerby	Henry	120	12		6. 0. 0		
								27	18 –
Incidents		p. particulars						3	– –
Salaries		A. B.					1 y to Lady 41	5	– –
D15-182-159(2)							Sot. charges mine Lady 1741	327	12 11

Ludmills Acco from Lady 1710 to Lady 1711

Mill chs from Lady 1710 to Lady 1710

		B. H						
Car Carriage	125 3/2	@ 1/		Q. Feder		85	3	6
		Ps	Ft 0.9.12	J. 3.				
Lads: smilled	1606	94.0.2.8		5.6	25.11.1			
rejinds	910	55.0.0.0		1.0	11.0.0			
Reduced	816 (A.B)	45.0.0.0		2.0	1.10.0			
unrejinds	666 C.D	39.0.0.0						
Tot marbled	1512	Ps						
Carr:	reduds: A.B. 816							
	unrejinds. C.D 666							
	1512 or 75 nals			15/8	58.15.0			
						97	16	1
Generals	Sund, Cart Iron, Wood, Smiths, Millwrights & Carpenters					50	—	—
	Masons Labourers, Sund & salaries							
						234	19	10



201

Lead Acco^t 1741. D^r

1740.						
Dec^r 31	To Stock				5 5 —	
1741 July	To W^m Leaton Acc^t Curr^t				1 — 7	
Aug^t 1	To Ditto				— — 6	
Dec^r	To Thomas Copelles Acc^t Curr^t				1 1 —	
		B H	P^l Lead	Fo P^l		
31	To Several Acc^ts	514. 1	1666 or	104. 2	793 18 10¾	
	To John Dent				200 — —	
	To profit & Loss Gained				347 3 5	
			1666 —	104 2	348 9 4¾	

1742.

D^r

1741.						
		P^l	Fo: C 2 to	Stone		
Dec^r 31	To Stock at 21 to a Tother	1527 or	102. 5. 1 — 14	at 11½ to a Pig	1216 16 6¾	
	To Grove wood charge				81 3 9	
	To Acc^t of Lead Carriage				64 14 6	
		B				
	To Our Carriage Acc^t	557 —			111 8 —	
	To Smhing & Drifting Charge	B H			106 18 9	
	To Charge of Wmning Our 556. 2				313 16 1½	
	To Contng Charges at the Mine				64 10 1½	
	To Mill charge for Smelting	Stone				
	1409 or	8^l at 11½ to a Pig	94. 7. 1. 14		36 12 11	
	To John Dent				20 — —	
	To Profit & Loss Gained				314 14 2¾	
		P^l	C 2 to			
		2936	196. 12. 3 —		2330 14 11	

Per Contra E^r

1741.		P^l	Fo:	P^l	
Dec^r 31	By Several Acc^ts	139 or	8. 11		118. 7. 10
	By Nathan Horn				13. 5. —
	By Ballance at 12. 15. 0 p^r Fo:	1527 or	95. 7		3216. 16. 6¾
		1666 —	104. 9		

Per Contra E^r

1742.		P^l	Fo:	C. 2 to	
July 7	By William Leaton Acc^t Curr^t	10a	6. 13. 2		84. 9. 11
Nov 25	By Ditto sold at Mills	1 —	1. 1. 14		17. —
	By Profits & Loss				204. 10. —
	By Ballance	2835 —	189. 17. 3. 14		2040 18. —
		2936 =	196. 12. 3 =		2330. 14. 11

APPENDIX 4

Colliery memoranda book 1774-95 (NRO: 3410, WAT 4/14)

Rules for mathematical calculation

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